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VIEWS, NEWS AND INTERVIEWS.

In the last 15 years about $350,000,000 has been invested in 2,750 electric light central stations in the United States, and during the same period some $250,000,000 has been invested in about 8,000 isolated plants. This shows the enormous development of the electric lighting business.

We have received from the University of the State of New York the *Library Bulletin*, giving legislation by States in 1896. In Ohio it has been decided that village electric light plants, in connection with waterworks, may be placed under the management of the waterworks trustees. Electric lighting companies in New York, if furnishing public lights, are entitled to eminent domain. In Utah all electric companies have eminent domain. In Rhode Island, railways or street railways may change to electric power and may contract for joint transportation of freight and passengers.

Ever since Victor Hugo made famous in "Les Miserables" the sewers of Paris, they have been one of the sights which venturesome visitors to that city aimed to see. These have been invaded by electricity. Boats are used in the larger tunnels, which are some 10 feet high and 18 feet broad, with a channel in the floor forming a canal 10 feet wide and three feet six inches deep, along which the sewage flows. The smaller branches are similarly constructed, but the canal is under four feet wide, and cars with flanged wheels run on the edges of the channel, which act as rails. The primary object of both boats and cars is to drag scrapers for cleaning the channel, the admission of visitors being, as it were, an accidental adjunct.

Both cars and boats are now propelled by electricity derived from accumulators contained in the leading vehicle. In order not to unnecessarily stir up trouble—and other things—from the liquid depths, the boats have no screws or paddles, but propel themselves by picking up a chain laid along the bottom of the sewage channel and passed over a driving pulley geared on to the motor. The train consists in busy times of six boats or cars and will accommodate as many as 100 persons.

Telegraphic Training of the Deaf and Dumb.

TO THE EDITOR OF ELECTRICAL REVIEW:

The present method of communicating words and ideas to the deaf and dumb has many imperfections that appear to me can be greatly remedied. The communication has not the perfection of speech; for what ideas are conveyed by a mixture of gesticulation and words are never as clear to the mind as those conveyed by a combination of words of a civilized tongue.

Allow me to propose a method to confine the training and education of the deaf and dumb in our eleemosynary institution for that class, on a telegraphic system, without the voice, and in a great measure without gesticulation. To enforce this system, have the pupil make himself familiar with the telegraphic symbols. To practice himself on this line he uses no instruments, but gives their indications by certain movements of the lips, mouth, and the use of an index finger. To the laity I would say: In telegraphy we have but three symbols—a dot and two dashes of different lengths, or a small dash and two long ones. Communications in any civilized language can be expressed by a combination of these symbols. To the deaf we apply the dot to express with a pucker of the lips; for the dashes, a separation of the lips to the degree indicated. At each end of a word a slight movement of the right hand or right index finger is given; at the end of a sentence a touch of the lips with the index finger. "Yes" is given with a nod and "No" with a shake of the head; "I don't understand you" with a blink of the eyes, etc. The preliminary training on this system is first to give object lessons, so as to give the true meaning of each word. After some progress with the pupil a grammatical construction of the language can be ventured upon. With these experiments it will be found that it will take less time to educate a pupil to a high standard than can be done under the old system. It would not take a long practice to make it graceful, much more so than eating, or the hilarity of a good laugh. The system would bear the stamp of intelligence and refinement, and would far supersede that crazy-looking gesticulation of the old system. This practice of the muscles of the face would not interfere or mar the expression of the emotions. A smile or a frown would retain their natural meaning. The gentility of the practice is that a communication can be given without attracting special attention. It may often conceal the infirmity of the subject. It virtually gives speech to the lips of the deaf and dumb.

A pupil well trained with this telegraphic system would soon prove an expert in a telegraph office, not in the ordinary way, but he could soon learn to read, from the action of the hammer, with the success some of our old experienced telegraphers can by the sound of the click alone. Those electro-deaf in civil life would give a wonderful impetus to telegraphy, as their friends would have to succumb to their intellectual training.

G. P. HACHENBERG, M.D.
Austin, Tex., January 26.

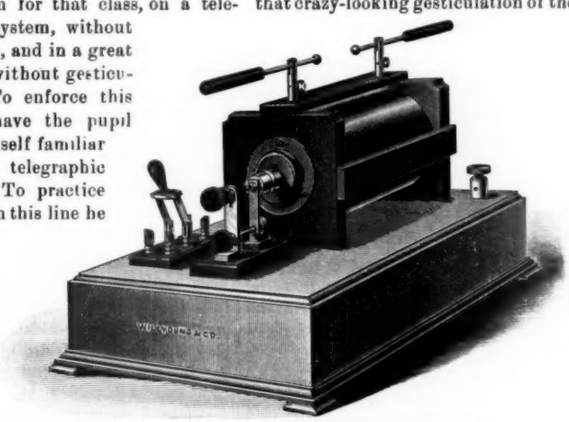


FIG. 1.—X-RAY APPARATUS FOR HOSPITAL WORK.—WILLYOUNG COIL WITHOUT ROTARY BREAK.

Willyoung X-Ray Apparatus For Hospital Service.

Messrs. Elmer G. Willyoung & Company, whose selling department is in charge of Mr. James G. Biddle, Drexel Building, Philadelphia, are making a form of X-ray apparatus which is being accepted by many operators as having certain important features. In a paper read by Mr. Willyoung before the electrical section of Franklin Institute, now being published and illustrated in the ELECTRICAL REVIEW, Mr. Willyoung's theories on this subject are fully set forth, and it is the aim here to show only several forms of apparatus as it is perfected for general introduction. Illustration, Fig. 1, shows a form of the induction coil without the rotary break.

With the great use of X-ray plants in hospitals and public institutions has come a demand for a means of running the induction coil from ordinary commercial lighting circuits. Up to very recently this has been impossible, save on very small coils. Messrs. Willyoung & Company have devised the forms of rotary break shown in Fig. 2, as constructed in connection with the induction coil. The use of this form of apparatus and its construction is fully described in the ELECTRICAL REVIEW, January 27. This has been devised specifically for use in hospitals and public institutions.

Here the coil, rotating break, condenser, etc., are all mounted upon one base. The secondary and spark points are adjustable. A rheostat in the base of the apparatus regulates the amount of current passing through the primary of the coil, while the motor-break regulator is operated by a projecting rod. To guard against throwing off the break while the coil circuit is still on, the W–S interlocking switch has been devised. In this the two switches have parts interlocking beneath the base that, with both motor and coil switch on, it is impossible to throw the former off without first throwing the coil off. This arrangement makes the apparatus perfectly safe against short-cir-

(Concluded on page 65.)

MUNICIPAL OWNERSHIP, DEFECTS AND DANGERS.

ABSTRACT OF PAPER READ BY MR. JOHN SCHUETTE BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION, JANUARY 20, 1897.

When times are stagnant, when everything seems to go wrong, when the people's minds are not fully occupied in their own business, then is the time when all kind of new theories are advanced for the betterment of the condition of the human race.

There is no doubt that if our people would have an occasion to study and discuss the municipal ownership question as thoroughly as they did the financial question in our last campaign, the result would be that most would discover the wrong impression they entertained on this point, but as long as they hear only one side of the question it is natural that they will judge from the point of view as presented to them.

From an extended experience in the electric lighting enterprises, I am satisfied in my mind that if this branch had been owned and operated under municipal control from the time the first light was installed to the present day, it would have been, on an average, far more expensive to the inhabitant than it has now been. There is hardly a franchise granted at the present day without limiting the charges for service rendered, and as long as such charges are reasonable, as long as the earnings are no more than other unlicensed enterprises, which I contend they are not, then municipal ownership will not be advantageous, but detrimental to the public welfare.

In case there should exist plants which, owing to loose franchises, should abuse its powers, it might be well to have a law, such as already exists in some States, by which a reasonable charge could be determined and regulated.

We do not and must not ask anything unreasonable; ask no special favors; but we do ask and expect that we shall be treated as any other enterprise—no better nor worse.

And in making this defense, the real main benefit of our association will be put to a practical test.

To watch the many bills which will be introduced at Madison this session requires eternal vigilance to keep track of them, and will, therefore, require a representative, one residing there preferred, who should attend to this particular legislation, engaged and under control of our Committee on Legislation.

Some of you may believe you have an ironclad franchise, not in danger of puncture, but let me assure you that in this progressive age nothing can withstand the new, heavy, powerful armament of our present day, and no one should expose and risk a trial in which he surely would have to succumb. The little assessment, whatever it may be, will be a bagatelle in proportion to the benefit derived.

ABSTRACT OF REPORT MADE BY SPECIAL COMMITTEE.

Your committee finds a large field of work, and the association probably acted none too soon in recognizing the growing sentiment of municipal ownership. The municipal wave passing over this country is widespread, and numerous central stations are threatened. Investigations warrant the statement that this is the most important subject for the attention of central-station men, and every member of this association should feel responsible in aiding the work of demonstrating to the public that the municipal scheme is not practical, and the majority of municipal plants, if carefully investigated, will prove to be gross failures. We were instructed to confer with the electrical manufacturers and obtain their promise of co operation in preventing the misrepresentation as to cost of installation, operation and results obtained from municipal plants. All of the large manufacturers claim to co-operate with us, but, in spite of their statements to that effect, they are not all supporting us. Persons in the electrical business who guide their opinions by observations of municipal operations can not honestly claim that municipal ownership is apt to prove beneficial to the municipality, and hence the advocates of this scheme must be regarded as either lacking the ability of observation, or else self-interest prompts their motives.

We endeavored to obtain the co-operation of the National Electrical Association, but were unsuccessful. We have also written the General Electric Company, the Westinghouse company and the Fort Wayne corporation, requesting to know the number of municipal plants established throughout the northwest during the past year where private stations already existed, and also the names of the manufacturers furnishing the steam and electrical apparatus.

We have had four appeals from central stations who were threatened with municipal ownership. As this is a public report, we think it well to withhold the names of all but one of these, which is Negaunee, Mich. In this case we did all possible to protect the central-station owners from having their property rendered useless to them, but the matter has progressed to such an extent where apparently nothing could help them except the courts, and we understand that the matter is now pending a decision of the Supreme Court.

At Madison, Wis., the establishment of a municipal plant was attempted, but failed to be erected, as sufficient votes could not be secured in the council to warrant the issue of bonds necessary to cover the purchase price of the plant.

We find that in the majority of instances the expense report as covering the cost of electrical lighting does not cover much cost, as is evidenced by finding electrical light expenses charged under separate heads, and in but few instances does the city figure anything against the plant for interest, depreciation, taxes, water rent, office rent, management, fire insurance, employers' liability insurance and general risk.

Mr. W. J. Buckley, of Chicago: I have been identified with the Fort Wayne corporation ever since it was started, and I am very glad, indeed, of an opportunity now to say this, that the Fort Wayne electrical corporation, as well as myself, take the position that municipal ownership is a fallacy and a failure. It is not in the province of this association to attack the manufacturers of apparatus, or to directly look to the manufacturer of apparatus for the cure of the disease that threatens it. A city wishing to buy a plant usually wants arc lights. In that case they can get bids from but three companies—the Brush Electric Company, the General Electric and ourselves. If they want incandescent lights, then, of course, we must include the Westinghouse company.

Mr. Coleman: I think it advisable that we should have some representative in Madison in some shape, and the different parties interested in different States should look after legislation in those States and look after it carefully.

TELEPHONE NEWS AND COMMENT.

A company has been incorporated to build a telephone line connecting Delhi, Walton and Deposit, N. Y. In Walton the Telephone Exchange is stringing 120 new lines for subscribers.

The Missouri & Kansas Telephone Company, Kansas City, Mo., are arranging to bury their wires in that city. This improvement will cost $200,000, and General Manager Burt hopes to have it completed by July 1, 1897, if the plans submitted to the Board of Public Works are approved.

In the Supreme Court of New York State Justice Beach dismissed the action brought by Charles A. Furbush against James S. Clarkson and Allen T. Nye to recover $300,000 for alleged breach of contract, growing out of the sale of the Mutual Automatic Telephone franchise to the Stand Standard Telephone Company.

At a meeting of the stockholders of the Bingham, Me., & Moose River Telephone Company the following officers were elected: Mark Savage, president; F. H. Preble, treasurer; Mark Savage, F. H. Preble, A. S. Burke, T. H. Spear, O. H. Houghton, directors. The company propose to put in a metallic circuit from Skowhegan to Madison.

An injunction has been asked to restrain the Southern New England Telephone Company at New Britain, Ct., from putting any of its instruments into the various fire-houses, on the ground that the council forbade the Fire Commissioners to make a contract with the company. This is peculiar enterprise. Telephones are a very valuable factor in such places.

The Bell Telephone Company's instrument statement for the first month of the new year shows a net output of 8,036, against 10,052 a year ago. It is interesting to know that the average monthly net output for the first half of 1896 was 11,819, and for the last half, 4,399, and 8,109 for the year. Thus the new year starts out favorably. Details follow:

Month, Jan. 30.	1896-97.	1895-96.	1894-95.
Shipments	14,417	17,620	7,631
Returned	6,4 1	7,568	5,945
Net output	8,036	10,052	1,686
Total outstanding	781,885	686,588	584,192

Mr. Paul Minnis, chief engineer of the New York Telegraph and Telephone Construction Company, and New York representative of the Best Telephone Manufacturing Company, of Baltimore, left this city on the 4th inst. for a southern business trip of about two months. Mr. Minnis is interested in the Southern Home Telephone Company, a parent organization lately organized to operate in the States of North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Tennessee. This company is being promoted under the auspices of the Southern Telephone Security Syndicate, a promoting and brokerage company organized for the purpose, and it is in the capacity of trustee of this latter organization that Mr. Minnis goes South. While in the South he will decide upon the location of a telephone factory to handle the overflow from the Best Telephone Manufacturing Company, of Baltimore, that company having found the demands upon it by its affiliated companies so far in excess of its possible present output that it is forced to establish subsidiary factories in order to take care of its increasing business. Inducements have been offered by three available southern cities, but Mr. Minnis states that it will probably be two or three weeks before the preference is given to any one of them.

The annual report of the particularly ably managed Southern New England Telephone Company, of New Haven, Ct., is as follows:

ASSETS.	
Franchise	$ 157,500 00
Construction	2,411,962 68
Supply department	56,606 58
Real estate	136,121 48
Stocks and bonds	97,302 50
Accounts receivable	91,367 23
Cash	32,181 20
Total	$2,983,041 75
LIABILITIES.	
Capital stock	$2,000,000 00
Surplus	109,508 68
Bonded debt	500,000 00
Debentures and floating debt	336,643 49
Sundry reserves	36,889 58
Total	$2,983,041 75

The business of the company for the year is shown by the following statement of revenue and expenses:

REVENUE.	
Exchange service	$404,064 89
Toll service	131,362 05
Private line	3,340 29
Real estate	8,634 84
Metallic circuit loop	3,900 46
Miscellaneous	1,163 24
Total revenue	$552,465 77
EXPENSES.	
General expenses	$ 66,703 54
Operating	104,326 88
Maintenance	128,585 75
Rental and royalty	52,249 96
Real estate	470 90
Interest	45,087 18
Total	$397,424 21
Revenue balance	$155,041 56

Senator Titus, Nebraska, presented a bill in the Senate for a reduction in charges by telegraph companies in the transmission of messages and regulating the same. The bill also provides a penalty for any agent or employé of a company to reveal the contents of messages, except to the person sending or receiving them.

As to charges, the bill provides that for messages of 10 words or less, exclusive of the address, not more than 15 cents will be charged for any distance of 200 miles. Over 200 miles, 20 cents, and one cent for each additional word above 10. For messages of over 10 words, transmitted as newspaper reports, the day rate shall be one-third of one cent per word, and for night messages one-sixth of one cent for any distance in the State. No extra charge shall be made for the delivering of messages within two miles of an office. Ten cents a mile may be charged for each mile above two, but the total charge shall not exceed 50 cents—on messages delivered from the office.

In each case of conviction for revealing contents of message, damages to the extent of $100 may be collected by the plaintiff. For violating the law as a misdemeanor, in charging excessive rates, the penalty will be a fine of not less than $50 nor more than $500, or imprisonment in the county jail for from 30 days to one year.

Electric Railways.

The Milford, Holliston & Framingham, Mass., Street Railway Company is arranging for the purchase of a new boiler and engine for its power-house, in view of the early opening of the new line to Medway.

The Buffalo *Express* recently illustrated the Chaudiere Falls at Ottawa, Canada, and paid a deserved compliment to Messrs. Ahearn & Soper, of that city, who have done so much to develop, electrically, this great water power. The street railway system is operated entirely by water power.

The directors of the West End Street Railway Company, of Boston, Mass., at their meeting awarded their new issue of $2,700,000 of 20-year four per cent construction bonds to Kidder, Peabody & Company, for a syndicate, at 98.199. The syndicate is made up of several leading New York and Boston houses.

Chairman Ward, of the Ways and Means Committee, has introduced a bill in the House at Jefferson City, Mo., for the assessment of street railroad property. It provides for the more uniform assessment and taxation of street railroads in cities having 100,000 inhabitants or over, thus making it applicable to St. Louis and Kansas City only.

A decision has been handed down by Judge Dickey against the Nassau Electric Railroad Company, of Brooklyn, N. Y., making permanent an injunction restraining it from carrying people to Coney Island for a single fare over the Brooklyn, Bath & West End Railroad Company's tracks, and granting $15,000 damages to the Brooklyn L Company, which brought the action.

A dispatch from Chicago says: "There is said to be much joking here about the queer combination apparently behind the new rival of Chicago City Railway, the General Electric Railway. The claim is reiterated persistently that leading New York banking interests are doing the financing. The backers in Chicago are politicians." Perhaps this is a case of prejudice.

The Atlantic Highlands, Red Bank & Long Branch, N. J., Electric Railway Company is negotiating for the purchase of mill property at Eatontown, with the intention of converting it into a power plant for supplying motive power for its trolley lines. The company intends to build a trolley line between Asbury Park and Freehold, in addition to the road it now operates between Long Branch and Bedford.

The West Chester, Pa., & Philadelphia Railway Company, which operates the trolley road from Philadelphia to Newtown Square, has just closed a deal whereby it becomes the owner of the hotel and a tract of 25 acres at Newtown Square, paying William Davis $40,000 for the same. They can now proceed with the building of the line to the historic resort at Castle Rocks, which it purchased a year ago. The road is to be extended to that place, a distance of eight miles.

Mayor Swift, of Chicago, has signed the General Electric Railway ordinance giving that company a 20-year franchise on several south side streets, including Wabash avenue. By the terms of the agreement the city secures the largest compensation ever exacted from a local street railroad, the company paying an average of seven and one-half per cent of its gross receipts per year during the life of the franchise. The underground electric system will be used exclusively.

The Calumet, Chicago, Electric Street Railway Company has passed into the control of the directors of the defunct National Bank of Illinois. The value of the bank stock depends largely upon the disposition of the road, on which $2,475,000 was advanced. No effort is being made at this time to effect a sale, and the directors of the bank have decided to carry on the enterprise until favorable opportunity is offered to dispose of the property. At a meeting of the directors of the Calumet railway, the resignation of F. W. Leach, H. B. White, Carl Moll and Robert Berger as directors was accepted, and their places filled by the election of Bank Examiner McKeon, George E. Adams, George C. Prussing and James R. Man. John Farson completes the directory. The officers now are: President, John Farson; secretary and treasurer, H. B. White; auditor, J. J. Williams, and general manager, H. M. Sloan.

President H. H. Vreeland, of the Metropolitan Street Railway Company, New York, officially confirms the announcement made in the ELECTRICAL REVIEW a few weeks ago that the electric underground conduit system will be installed on the horse-car lines of the company. He says: "We have made the contract for the engines and the electrical machinery necessary to equip the Sixth, Eighth and Amsterdam avenue lines on the west side, and the Fourth and Madison avenue lines on the east side, and also the Fifty-ninth Street Crosstown line. The street construction will be begun as soon as the weather becomes sufficiently settled to make it practicable. We intend to build the same kind of an underground electric railway as we now have in operation on Lenox avenue. From all that we have been able to learn, this system has certainly given satisfaction to the residents along the line, and we have remedied minor defects from time to time, until now we are satisfied that the large expenditures of money necessary to improve these longitudinal lines is fully warranted by the operation of our experimental line during the past 18 months." A view of the conduit adopted was shown in cross-section in this journal January 13.

Incandescent Lamp Patents.

The incandescent lamp manufacturers are again agitated over the patent question. The Westinghouse Electric and Manufacturing Company, which owns the Sawyer-Mann patents and the patents of Edward Weston, as well as some other patents relating to the manufacture of lamp filaments, is notifying the trade that they must pay royalty and take out licenses. The amount of this royalty is as yet an unknown quantity, but some estimate that it will be about two cents a lamp. As there are probably from 12,000,000 to 15,000,000 incandescent lamps used annually in the United States, a royalty of two cents a lamp, if it comprehended the entire output, would make a very neat revenue for any company.

Twenty-fifth Anniversary of the Stevens Institute.

The Stevens Institute of Technology will celebrate its twenty-fifth anniversary on February 18 and 19 next. Preparations are now being actively pushed to make the event a memorable one in the annals of the Institute. The banquet to be held at the Hotel Waldorf, New York, will be attended by several hundred graduates and undergraduates, as well as by many representative men in the engineering and mechanic arts, who have been invited to be present. The exhibition of the work of the Institute's graduates promises to be one of the most attractive features of the celebration. The application for space will tax severely the capacity and facilities of the Institute, as many of the exhibits will be shown in actual operation.

The exhibits range from single devices to a complete electric light plant operated by gas engine. The latter is the invention of Mr. F. P. Nash, a graduate of the Institute, who bears the distinction of being among the five most prolific inventors in the United Sates, there being over 200 patents issued to him, on various types and details of gas engines, watermeters, etc. The exhibition of photographs, working drawings of apparatus designed, and works carried out by graduates, will also be of more than usual interest and value, and will be open to the public at the Institute, Hoboken, N. J., on February 19.

KIND WORDS.

WOULD BE LOST WITHOUT IT.

To the Editor of Electrical Review:

I would be lost without the ELECTRICAL REVIEW. J. A. MARRS.

TRIED TO, BUT COULDN'T DO WITHOUT IT.

To the Editor of Electrical Review:

Mr. ——— has again changed his mind and renews for 1897. You remember we wrote you, at his request, to stop it, but he came in again and said he wanted it.

Please send back numbers from January 1, 1897, and bill to us.

News Dealer.

Boston, February 5.

PERSONAL.

Mr. C. Le Blanc, chief engineer of the Compagnie Générale de Traction, of Paris, was a recent visitor to New York city.

Col. S. C. Booker, of the Phœnix Carbon Manufacturing Company, St. Louis, who has been in the East for some weeks, has just left for the West.

Mr. William Carpenter Camp, vice-president and treasurer of the Metropolitan Electric Company, of Chicago, and Mrs. Camp are at the Waldorf, New York.

Mr. R. T. McDonald, of the Fort Wayne Electric Corporation, is in the city, having just recovered from a two weeks' siege of the grip at his home in Fort Wayne.

Mr. R. L. Daniels, of the H. B. Camp company, manufacturers of the Camp system of conduits, Aultman, Ohio, has been in New York much of January.

Hon. H. L. Storke, president of the Empire State Telephone Company, and postmaster of Auburn, N. Y., was a visitor at the metropolis Monday of this week.

Mr. J. C. Chamberlain has returned from a three months' trip over Europe, investigating the storage battery works of that country, chiefly as applied to electric launches. Mr. Chamberlain is an authority on this branch of electrical work, and is at the head of a large manufacturing company devoted to this branch of manufacture.

Mr. Frank Laughlin, the energetic and progressive head of the Solar Carbon and Manufacturing Company, of Pittsburgh, has been enjoying a business sojourn in the metropolis for a week past. Mr. Laughlin's company is one of the very successful carbon companies which possesses some kinks in manufacturing that belong to it alone.

Mr. W. McCullough, who has been looking after the Canadian General Electric Company's interests for the past three years in the West, is now representing Mr. Hugo Reisinger, New York, importer of the celebrated "Electra," highest-grade, Nuernberg carbons. While the Canadian General Electric Company regret parting with one who has always been to the front where anything electrical was required, Mr. Reisinger is to be congratulated on his good fortune in securing the services of such an energetic salesman. Mr. McCullough's numerous friends will be pleased to learn of his new connection and will wish him much success in his new position.

The Boston Associated Board of Trade and Citizens' Association have petitioned for an act to compel corporations using streets of cities and towns for wires, rails, pipes, etc., to pay for use thereof in case of railway companies. The latter are to pay a per cent of gross earnings and a sum equal to any dividends in excess of 6 per cent on capital stock.

X RAYS, APPARATUS AND METHODS.

ABSTRACT OF PAPER READ BEFORE THE ELECTRICAL SECTION OF THE FRANKLIN INSTITUTE, PHILADELPHIA, DECEMBER 1, 1896, BY ELMER G. WILLYOUNG AND H. LYMAN SAYEN.

(*Concluded from page 51.*)

LIFE OF TUBES.

The life of tubes in general is limited.

A. By time required for the vacuum to become too great, hence requiring re-exhaustion.

B. By ability to stand the electrical strains.

A. Applies to all tubes so far as we know, save the Bowdoin tubes, probably six or eight hours continuous working, or the equivalent suffices to incapacitate the average tube. We think that, even with the Bowdoin tube, there is an evident tendency to eventual very high vacuum, but the time required would be very great relatively, say 10 to 15 times that operative in the case of other types of tubes.

B. All well made tubes (from the glass-blower's standpoint) are about equally liable to this limitation. It is probable that these strains are cumulative in their effects upon the tube, the latter gradually weakening until, eventually, breakdown takes place, with secondary discharges much less than would have been originally required for breakdown.

THE STAND

has been divided for applied X-ray work. With it the tube may be placed in any position within a cylinder six feet high and six feet in diameter, thus making it possible to get under or over a patient, no matter what the latter's position. Rods of vulcanized fiber clamp to the stand in any position and carry the lead wires of the tube, thus keeping them away from one another and from the metal of the stand. They carry little spring clips at their extremities, by which the wires are caught without tying or bending. The whole stand is of bicycle tubing and very rigid.

THE SUBJECT.

The patient should, of course, be placed in as easy a position as possible. For body pictures, hip and knee joints, etc., a recumbent position may be assumed. The plate should lie beneath and upon a stiff board backing to avoid risk of breakage. Work upon the shoulder, neck, head, etc., may be done with the patient straddling a straight-backed chair, facing the back and leaning the body against the back for support. The plate may be bound fast to the body by bandages.

LAWS FOR EXPOSURE.

Since the X rays proceed in straight lines from (approximately) a point source, the intensity of their action varies inversely as the square of the distance from the source. Hence the time of exposure should vary directly as the thickness of the intervening substance. To apply these principles in practice, take a trial picture of the hand at five-inch distance, this being amply sufficient for good definition with such small bones. Say one minute is required for a good result. Then to take a hip joint, we estimate the thickness of the latter to be, say, 10 times that of the hand. We must, therefore, expose 10 minutes on account of thickness alone. But owing to the greater distance of bones from plate, the tube must be removed much further to get definition. At least 15 inches from the dry plate should be given—this is three times the distance used for the hand, from which the times require to be as the square of these figures, or as one is to nine. The total exposure must, therefore, be 90 minutes. This method gives something to go upon. After a little experience, perhaps the most convenient thing to do is to arrange a little table, based upon previous results, and showing times and distances required for well defined results for distinctive parts of the body.

SHORT EXPOSURES.

We have obtained, and do regularly obtain, without difficulty, well defined pictures showing complete detail of the osseous structure involved in times and with distances from dry plate to reflector, as below:

Hand and wrist, 5 to 10 seconds at 5 inches.

Forearm, 10 to 15 seconds at 5 inches.

Arm above elbow, ½ to 1 minute at 7 inches.

Shoulder, 10 to 15 minutes at 10 inches.

Thorax, 15 to 30 minutes at 10 inches.

Hip joint, 30 to 45 minutes at 12 to 15 inches.

Stones in kidneys, 30 to 45 minutes at 12 to 15 inches.

Glass, iron, lead, etc., in any part of trunk, 30 minutes on an average at 12 to 15 inches.

We have very carefully investigated every claim to quicker exposures than these, often by a personal visit, sometimes by correspondence with personal friends whose reliability was undoubted. We have been unable to learn of any results equally good having been obtained in shorter times by any one, at any place, with any form of apparatus, and we do not believe any such have been obtained.

MANIPULATION DEVELOPMENT OF THE PLATE.

Suitable and well constructed apparatus is not the only essential to good results. A great deal depends upon the operator, and comparatively trivial differences in procedure make all the difference between success and failure. We describe here the method which we follow and which allows us to count with certainty upon securing at least nine successful plates for every 10 exposures.

A. General Adjustment: First, see that the coil is working smoothly, so as to give a uniform discharge in the primary. The secondary spark points should be separated by the distance given by the makers as proper for the tube. The coil must then be adjusted, either by changing the electro-motive force at the primary or by variation of the vibrator adjusting springs so as just not to spark over this air gap. The tube should then be joined in parallel with this secondary spark gap. The coil may then be started up, using the fluoroscope to show whether direction of discharge is right. If not, the primary current should be reversed. If X rays are not now profuse, the secondary discharge points should be further separated and the vibrator springs tightened so as to produce correspondingly greater discharge. Continue this until either X rays are secured as desired or the tube becomes too hot, or possibly bluish, or pink in color. Blue denotes too low a vacuum to expect X rays, but often a gentle running of the tube for 10 or 15 minutes while in this condition will raise the vacuum to a suitable value. Pink denotes a very low vacuum and usually means, in a tube which has ever been right, a puncture or leak. Such a tube can only be made good by re-exhaustion and repair. With most tubes a vivid green fluorescence is the sign of the X-ray vacuum. With the Bowdoin tubes, as also with many others, the most efficient condition is with the platinum reflector plate at cherry-red heat over an area of half or two-thirds that of the little finger nail.

Sometimes the vacuum will be too high for the production of X rays with any length of secondary discharge. It may be reduced by gentle warming of the tube by a spirit-lamp flame. Some reverse the current in the tube, but this is apt to blacken.

Sticking of the vibrator must be guarded against; it is often fatal to the tube. This is because of the much larger current through the primary when such sticking occurs. Upon release, therefore, a secondary discharge much above normal is produced, and this the parallel spark gap is unable to carry off. The tube, therefore, receives much more energy than it should, and may break down, even though the parallel spark gap be as advised by the manufacturers.

B. The Plate and its Development: We have used at one time and another a number of different makes of plates with very fair success. For some time past we have confined ourselves to the Carbutt X-ray plates, and, though we are not prepared to say that they are the best plates to use, the results are so uniformly good as to make it seem inadvisable to us to try other plates not radically different in principle.

For developer we use the Carbutt "J. C. tabloids"—three J and three C to five ounces of water—add about two drams of restrainer (the usual 10 per cent solution). Dr. Stern, of the Philadelphia Polyclinic, advises heating this developer until quite warm to the touch just before using. This we have found so good that we have adopted it as part of our procedure.

From 15 to 20 minutes will be required for development. The image will come up very slowly and not very sharply. Not much detail will be visible by holding up to the light. Continue development until the general main outlines have appeared and faded away to a general blackness upon the glass side. Then rinse and hypo.

The fixing generally requires from a half-hour to two or three hours. This long time is probably partly due to the unusual thickness of the Carbutt X-ray films, but probably even more to some chemical condition set up by the unusually large quantities of restrainer used. Mr. Carbutt advises three J and three C tabloids to six ounces of water to 20–30 drops restrainer. Our experience is that a plate so developed always requires intensification — a tedious nuisance which can never give so good results as a normally exposed and developed plate.

The New Castle, Pa., Traction Company began operations on their lines Saturday, January 30. The members of the company are Hon. R. R. Quay, Senator Kennedy, De Witt Dilworth and superintendent Wm. Cummings, all of New Castle. The Walker company furnished the generators, and the Westinghouse company the motors. The opening ceremonies were quite elaborate.

The Protected Rail Bond.

The form of a rail bond being introduced to the street railroads by the Forest City Electric Company, of Cleveland, Ohio, is worthy of attention because of important features of merit. The bond is placed under the fish-plate and is protected from injury, or it can be under the base of the rail. Union with the rail is secured by hand-riveting or with the special bond-welder made by this company. The terminals give large area of contact with the rail, and the shape and construction of the bond freedom from torsional strain at the union with the rail, and is flexible to vibrations and yielding to contraction or expansion. The construction is of flattened copper wires, with the ends cast-welded into copper terminals and drop-forged to size and finish.

The improved "Cleveland" bond-welder, shown in illustration, Fig. 2, greatly facilitates the work of bonding and drilling, and is almost automatic in operation.

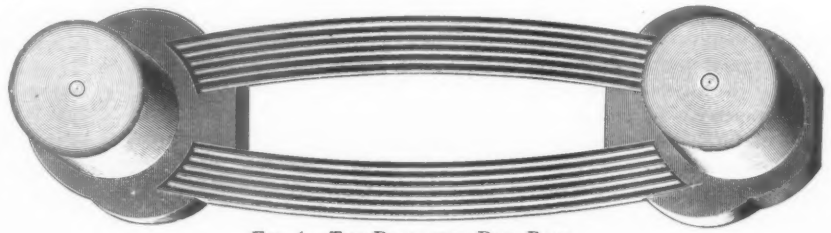


FIG. 1.—THE PROTECTED RAIL BOND.

An Electric Laundry Iron.

The almost universal use of electric lights in hotels and apartment houses interferes seriously with the use of many household conveniences, and, being alive to the needs of the times, the American Electric Heating Corporation, of Boston, in addition to providing small portable stoves, chafing dishes and curling-iron heaters (which may be attached to lamp sockets), offer to the trade a small laundry iron of very convenient form and handsome finish. It is especially

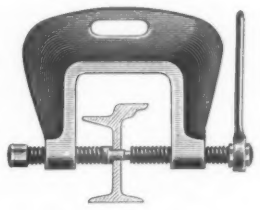


FIG. 2.—THE "CLEVELAND" BOND-WELDER.

designed for the household sewing-room and for ironing laces, handkerchiefs and other light work; for shining up the master's silk hat and pressing his trousers; on a pinch, though, a heavier iron would be better. The current required is two amperes on 110-volt circuits, and the iron is made for direct or alternating current and for all the usual voltages, as, in fact, are all of their appliances. A feature of all of the new electric heating appliances is that they reach the desired temperature in from two to three minutes, and because of their perfect cleanliness and other conspicuous advantages over the older methods, seem to be ideal.

WILLYOUNG X-RAY APPARATUS FOR HOSPITAL SERVICE.

(Concluded from page 61.)

cuits, while at the same time preventing the annoyance of frequently replacing fuses otherwise "burnt out."

With this machine, it is claimed, no preparation is required, save to plug the terminal into a properly located socket. It may thus be placed upon a table and moved from ward to ward in a hospital.

A feature of the Willyoung coil is the adjustable condenser. This, as its name implies, is a condenser where value may be varied at will. It is mounted in the coil base, and a pivoted switch allows a greater or less number of sections to be thrown in as devised.

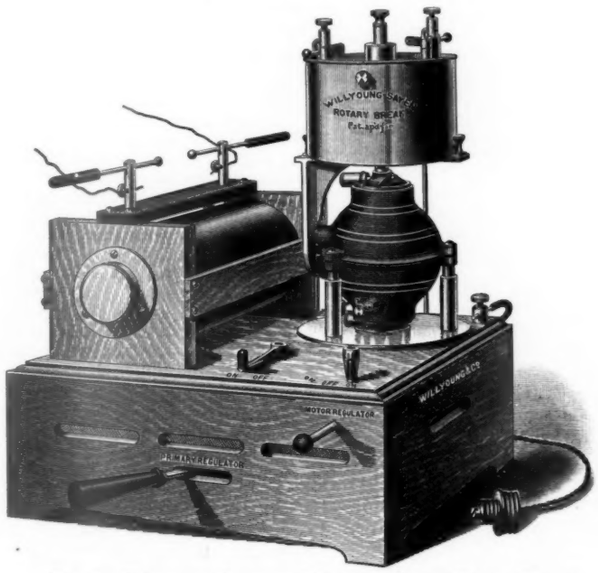


FIG. 2.—WILLYOUNG COIL AND WILLYOUNG-SAYEN ROTARY BREAK.

After investigation of vacuum tubes Messrs. Willyoung & Company decided in favor of the "Bowdoin" tube, and arranged with the inventors, Professors Robinson and Hutchins, of Bowdoin College, for its manufacture. This tube is claimed to be practically unvarying in its vacuum and not to blacken.

In X-ray work it is necessary to support the tube in almost any position with reference to the patient, who may be standing, sitting, reclining. The wires must be always so carried as to be clear of the body of the tube itself, the metal of the stand and the patient. In Fig. 3, Universal stand devised for this purpose, a tube may be placed in any position within a cylinder six feet in diameter and six feet high. The wires are supported at the ends of adjustable rubber rods attached to the stand and are held there by spring clips.

FIG. 3.—WILLYOUNG "W-S" UNIVERSAL X-RAY TUBE STAND.

An Electric Light Plant for the Dutch West Indies.

An electric lighting plant for Curacoa, D. W. I., is being supplied by Mr. F. A. Wunder, of the New York branch of the Fort Wayne Electric Corporation. This plant has been in contemplation for about three years, and is to be situated in Willemstad, the capital. It is to be operated in connection with the waterworks of the town, which was installed there a few years ago.

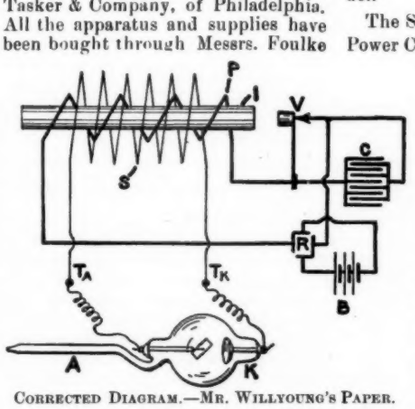
The shipment consists of engine, dynamos, instruments, submarine cable wire, iron poles and supplies.

The engine is 76-horse-power capacity and built by McIntosh, Seymour & Company.

The dynamos consist of a Wood compound-wound, low-frequency alternator and a 35-light Wood arc dynamo, built by the Fort Wayne Electric Corporation, of Fort Wayne, Ind. These dynamos are to be accompanied by a very handsome marble switchboard, fitted with Wood standard instruments. The arc lamps are to be of the latest double-carbon Wood type, and are to be provided with large street hoods, arranged for hanging.

The submarine cable, which is included in the shipment, is to be laid across St. Ann's Bay, which is about 700 feet wide at the point of crossing.

In connection with the alternator there will be a series incandescent circuit run with a bankboard regulator, the rest of the incandescent lights being operated from transformers. The iron poles, which will number over 300, are of standard pattern, and have been furnished by Morris, Tasker & Company, of Philadelphia. All the apparatus and supplies have been bought through Messrs. Foulke & Company, of 25 Beaver street, New York, for Mr. L. B. Smith, of Bangor, Me., who formerly was United States Consul and who has been in Curacoa for a number of years.



CORRECTED DIAGRAM.—MR. WILLYOUNG'S PAPER.

The operation of the plant will be under the supervision of Mr. Edo. Anto. Giberga, who was formerly in charge of the electric light plant at Havana.

A Correction in Mr. Willyoung's Paper on X Rays.

TO THE EDITOR OF ELECTRICAL REVIEW:

An error occurred in Fig. 2 of my article, "X Rays, Apparatus and Methods," in your issue of January 27. The error is one of inadvertence on the part of the draftsman, apparently. I will be glad to have it corrected through your columns. As the figure was originally printed, the battery "B" was short-circuited through the reversing switch "R."

Very truly yours,

ELMER G. WILLYOUNG.

Philadelphia, February 2.

ANNUAL ELECTIONS.

The Oneonta, N. Y., Electric Light and Power Company has elected the following officers for the ensuing year: President, F. D. Miller; vice-president, M. L. Keyes; secretary and treasurer, G. A. Lane. Directors, the above-named officers and A. L. Mendel.

The St. Albans Electric Light and Power Company at its annual meeting elected the following officers: M. Magiff, J. M. Foss, A. S. Richardson, D. D. Ranlett, W. B. Fonda, W. Tracy Smith, J. W. Hobart, of St. Albans; and George F. Steele and S. B. Paine, of Boston, were elected directors. The directors elected M. Magiff, president; A. S. Richardson, vice-president; W. H. Chaffee, secretary and treasurer, and G. F. Steele and J. W. Hobart, auditors.

The stockholders of the Suburban Rapid Transit Company, of Pittsburgh, Pa., elected the following board of directors for the next year: Thomas A. Noble, president; C. E. Succop, R. P. Cunningham, E. F. Hays, W. T. Cowan.

At the election of the directors and officials of the Mahoning Valley, Ohio, Electric Railway Company, James Parmelee, B. F. Miles, G. E. Herrick, Cleveland; A. A. Anderson, J. G. Butler, Jr., Youngstown; C. F. Clapp, Warren; R. G. Sykes, Niles, and W. H. Lawrence were chosen directors. The directors elected officers as follows: James Parmelee, chairman of the board; B. F. Miles, president of the corporation; C. F. Clapp, first vice-president; R. G. Sykes, second vice-president; A. A. Anderson, treasurer; John E. McVey, secretary.

At a meeting of the Worcester, Mass., Traction Company, Thomas C. Barr, of this city; C. Howard Clark, Jr., of Philadelphia; Cassius M. Wicker, of New York, and A. George Bullock, Francis H. Dewey, Charles B. Pratt and Stephen Salisbury, of Worcester, Mass., were re-elected directors.

At the annual meeting of the Springfield, Mass., Street Railway, the following officers were elected: John Olmsted, George M. Atwater, Gideon Wells, Frederick Harris and A. E. Smith. L. E. Ladd was elected auditor. After the meeting of the stockholders the directors met and organized as follows: President, John Olmsted; treasurer, A. E. Smith; clerk of corporation, Gideon Wells.

At the annual election of the Poughkeepsie, N. Y., and Wappinger's Falls Electric Railway Company, J. W. Hinkley was re-elected president. Frank B. Lown, W. H. Wood, Silas Hinkley, W. K. Roy, E. M. Davidson and William Bogle were elected directors.

At the annual meeting of the L. & A. Electric Light Company, of Lewiston, Me., the following officers were elected: President, A. R. Savage; secretary and treasurer, Daniel Briggs; auditor, T. F. Callahan. Directors, A. R. Savage, F. M. Jordan, George C. Wing, Seth D. Wakefield, J. F. Boothby, L. Linn Small, N. I. Jordan. E. P. Rowell was re-elected superintendent.

The annual election of the Oswego, N. Y., Light and Power Company has resulted as follows: President, C. R. Heaton; vice-president, E. W. Stone; secretary and treasurer, G. F. Andrews; superintendent, Horace Yothers. Directors, W. G. Phelps, Hon. G. F. Lyon, C. R. Heaton, W. S. Truman, E. O. Eldridge, G. F. Andrews, E. W. Stone.

The Norwalk, Ct., Electric Light Company has elected the following officers: President, Edwin O. Keeler; vice-president, Elbert S. Adams; secretary and treasurer, William E. Guthrie; assistant treasurer, H. M. Francis.

At the annual meeting of the Charlestown, Mass., Gas and Electric Company, James F. Hunnewell, James A. Sawtell, Charles F. Byam, John Turner, Mark F. Burns, Charles R. Lawrence. Charles F. Fairbanks were elected directors, and George B. Neal, clerk and treasurer. At a subsequent meeting of the directors Mr. Hunnewell was re-elected president.

The Citizens' General Electric Company, of Louisville, Ky., at their annual meeting elected the following officers: J. J. Harbison, president; J. C. Bockee, vice-president; A. M. Worthington, secretary, treasurer and general manager. The following were elected directors: Abner Harris, J. C. Durrett, Henry Schroder and W. T. Grant.

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Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, FEB. 10, 1897.

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Mr. William Berri, newly appointed Brooklyn Bridge Trustee, is favorable to the use of the Bridge for the trolley and elevated railroads. The millions of inhabitants of Brooklyn and New York will bless the man who brings to pass through trains from the Harlem River to where, at Coney Island, the eastern line of Greater New York is cooled by the Atlantic Ocean.

THE QUACKS AND ELECTRICITY.

In a recent address Dr. George M. Sternberg speaks of "Pseudo-Science in Medicine," and describes the use made of the electric belt, "Electropoise," "microbe-killer" and the X ray by the army of quacks "who trade upon the imperfect knowledge of the masses, and by plausibly written advertisements convince many, even of the educated classes, that their particular method of treatment is based upon the latest scientific discoveries."

Continuing, Dr. Sternberg says:

"A Franklin draws lightning from the clouds; a Galvani shows that an electric current may be developed by the contact of metals, and that such a current causes muscular contraction; and innumerable patient investigators add to our knowledge of electricity. The scientific physician avails himself of this potent agent for the treatment of certain ailments in which it appears to be indicated, but admits that he meets with many disappointments in his clinical experiments. The pseudo-scientific quack writes, or has written, advertisements in which fact and fiction are so commingled that even educated persons may be deceived, and, having aroused interest in the alleged therapeutic value of this mysterious agent, offers his electric belt, or finger ring made of two metals, or pocket battery, as a sure cure for certain specified ailments, or, if less modest and more certain of the credulity of the public, as a cure for all of the diseases to which man is subject.

"Another pseudo-scientific 'discovery' which is largely advertised in the monthly journals is the 'Electropoise,' which is described as 'a little instrument which enables the system to take on oxygen freely from the atmosphere.'"

A quoted certificate from one Rev. Wm. McDonald, given solely "for the good of the afflicted," says:

"But it does not generate electricity and is in no sense a battery, belt, sole, or anything kindred to them. It consists of a small cylinder called a 'polarizer', which is used in connection with the patient's body by means of a common electric cord. This polarizer causes oxygen from the atmosphere to be absorbed by the entire surface of the body with great rapidity, the strength of the absorption being regulated according to the ability of the patient to receive."

Dr. Sternberg makes the following suggestion to the reverend indorser of "Electropoise":

"We would suggest to the Rev. Wm. McDonald that he try the following simple experiment: Having connected the 'polarizer' with his leg by means of the 'common electric cord', let him place his one hand over his mouth and nose, thus shutting off oxygen of the atmosphere from the lungs, which have been provided by nature to furnish the necessary supply of this gas. Now let him note by a watch how long the supply of oxygen 'absorbed from the entire surface of the body' will answer as a substitute for nature's method of supplying this gas.

"The spectacle of a learned clergyman, supplied by nature with a brain and a pair of lungs, sitting day after day with an 'Electropoise' attached to his leg for the purpose of 'taking on oxygen freely from the atmosphere,' recalls the blue grass craze of 25 years ago."

The announcement of the Chicago quack who, in describing his own special X rays, says "they pass through the body down to the floor, and back to the coil again, completing the circuit," puzzles Dr. Sternberg, who thinks that, inasmuch as X rays pass through wood, this mysterious action of the floor calls for further explanation. This same western scientist is quite busy killing germs and microbes and disinfecting patients who presumably have just passed over the Chicago River. Hear him:

"For the last eight months I have had patients under the X ray in my laboratory from 9 A. M. to 6 P. M., duration of treatment varying from a half to four hours at each treatment, and not once with any bad result in any case."

Think what a practice he must have, with patients coming from 9 A. M. to 6 P. M. seeking the latest *scientific* treatment.

Dr. Sternberg concludes his remarks by saying:

We do not propose to prejudge the question of the possible therapeutic value of the X ray, but we think it safe to predict that it will not be found of any value for the destruction of pathogenic bacteria in the tissues, inasmuch as it has been shown by several competent observers to have very little, if any, germicidal action; and because there is no experimental evidence which justifies the belief that these low vegetable organisms can be destroyed by any physical or chemical agents which would not at the same time destroy the vitality of the less resistant cellular elements of the tissues.

A NATIONAL UNIVERSITY.

There should be only words of advocacy in the scientific and technical press for the proposed National university at Washington. One of our valued contemporaries, *Science*, strongly approves of such a university. Among other reasons it gives the following, which we heartily indorse:

A great national university would be the head of our educational system. It would not interfere with existing universities any more than these interfere with our colleges or our colleges with our schools. Our present universities consist chiefly of professional schools, on the one hand, and of colleges for the instruction of boys, on the other. They are, indeed, developing toward true universities, but nothing could better hasten and direct this development than a national university.

From a theoretical point of view it would seem that all the arguments which have been urged against the establishment of a national university turn out to be in its favor. The cost, the incompetence of government and the claim that existing universities suffice are, however, practical difficulties which we do not underestimate.

The present Commissioner of Education, and perhaps the regents of the Smithsonian Institution, could govern the university. Examiners could be appointed from leading representatives of science and learning who would meet yearly for a week of convocation in Washington. We believe that, without radical changes and with nominal expense, there could be established at Washington a national university likely to become the world's greatest university.

If it should prove to be possible to transmit electric power from Niagara Falls to New York city economically, would many of our electrical engineers be surprised?

INSURANCE AS AFFECTED BY ELECTRICAL CONSTRUCTION.

ABSTRACT OF PAPER READ BY MR. GEO. S. M'LAREN BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION AT MILWAUKEE, JANUARY 20, 1897.

In giving a paper on electricity as viewed from an insurance standpoint, I desire briefly to discuss the position taken by the underwriters in regard to its use, and to mention a few of the greatest dangers to be avoided.

Now, each and every energetic business concern is trying to protect its business in all possible ways. The insurance companies do the same as any commercial house. They try to write a large number of risks, and probably owing to the peculiar nature of their business they protect it more than any other organization.

Why, then, should the underwriters receive so much opposition to their work? Why not aid them in making their losses as small as possible, and in that way make them better able to give you low rates of insurance.

It is for these reasons that insurance companies have organized an electrical inspection department.

It seems to me that the more insurance companies insist upon good, practical safe wiring and use of electrical apparatus, the better it will be for the central-station owners and all concerned.

Let us take, first, the benefit to the station owner of a careful inspection of electrical equipments. When a building is being wired he does not have to keep a man constantly watching the work to see that it is done correctly, but when the time comes to connect the installation to his system, he simply inquires if the work has been approved by the underwriters, and, upon an affirmative reply, the connection is made; but that is only the beginning. He knows that the building is inspected every so often; he knows that there is some one constantly on the lookout for trouble and defects over his entire system, and even watching the work of his own men, and many a leak and many a cause for serious trouble is brought to the notice of station owners by insurance inspectors.

Even the supply man and the contractor (provided they sell good material and do good, careful work) are aided by the insurance companies, for the Underwriters are always ready to recommend the best goods and the most reliable workmen.

Instead, however, of taking this view, many lighting companies try to furnish current to as many customers as they possibly can, and seem to base their probable profits upon the number of lights on their system instead of upon the actual cost of operating those lights. Why should there not be as severe a law in regard to the efficiency of electrical workers as there is concerning plumbers? Why should contractors be allowed to hire small boys to do a man's work? There is not one out of 20 of the boys (aged from 12 to 17 years) employed by electrical contractors who know how to correctly make, solder and tape a joint, connect up simple apparatus, or even bore holes for bushings.

More important points in wiring are "the correct location of fuses," "the grounding of wires," "the wiring of fixtures," "the use of flexible cord" and "the placing of inflammable material near electrical apparatus." Let us discuss them briefly in the order mentioned:

Cut-outs should be centrally located, of easy access and entirely separated from inflammable material. They should never be scattered promiscuously throughout a building. I do not believe in even placing fuses in the canopies of fixtures or in rosettes for cord drops, especially not in damp places.

Slow leaks and the grounding of wires on gas and other pipes cause a considerable loss each year. They do not take sufficient current to blow a fuse, but instead, either form an arc or slowly work on the surrounding substance until they have become thoroughly charred and at last ignited.

Fixture work is an important branch of electric wiring, and should receive more attention than is generally given to it. If some manufacturer would introduce an insulation of small diameter, which could not be easily cut, and was still moisture-proof, it would find a ready market.

The use of flexible cord in electrical wiring is a matter of much concern to the underwriters. We are now advocating the use of a cord with a solid-rubber insulation of at least $\frac{1}{32}$ of an inch in thickness, which in turn shall be covered by a braid.

Here I would like to read from a few experiments on the heating effects of lamps. A 16-candle-power Edison lamp was screwed into a porcelain socket and lighted by the use of a 112-volt current, the lamp taking 48 amperes. The temperature of the room was taken and found to be 22 centigrades. Different materials were then placed over and against the glass bulb with the following results: White tissue paper began to smoke after three and one-half minutes, at a temperature of 60 centigrades, and after six minutes, at a temperature of 90, it burst into flame. Yellow woolen cloth smoked some after eight and one-half minutes, at a temperature of 100, but did not flame. Black all-woolen cloth, with a 32-candle-power lamp, using 92 amperes, smoked freely at two minutes. After five minutes 100 degrees was reached, and at eight minutes, 150 degrees, when the cloth burned. The same was tried with black all-silk goods, which reached 150 degrees in seven minutes, but only charred and fell to pieces without flaming. Cotton batting, with a 16-candle-power lamp, smoked in two minutes at 70 degrees, and in eight minutes, at 150 degrees, it burst into flame.

As electricity is comparatively a new feature in insurance, there are comparatively few statistics in regard to losses from its use, so it would be almost impossible to state how much increase should be added to the rate on a risk where, for illustration, weather-proof wire is used instead of the best grade of rubber insulation, or when no spark-arresters are placed on the arc lights.

It has seemed best to have a standard set of requirements governing all electrical equipments, and to require that this standard be strictly enforced. There are a few exceptions to this rule; viz., where the general condition of the plant is not good, a decided increase is sometimes added. Then, where a 500-volt current from the trolley wire is used, one per cent is added to the regular rate.

DISCUSSION.

Mr. P. H. Korst, of Racine: I would like to inquire of Mr. McLaren if, when electric light is used, it is considered a better risk than where kerosene lamps are used?

Mr. McLaren: We consider a correctly installed electric light equipment far better in every way than a kerosene lamp outfit.

Mr. Debell: How is it compared with gas?

Mr. McLaren: No increased rate is added for the common use of gas. First-class electric light installation is the safest there is.

Mr. G. A. Davis, of Neenah: Which is considered the best mode of wiring in sealed or unsealed work—rubber or waterproof wire?

Mr. McLaren: We do not consider the use of waterproof wire inside of buildings at all. Rubber-covered wire, with good braid, is the only satisfactory insulation.

Mr. F. A. Copeland, of La Cross: I noticed in the paper that the writer does not recommend putting the fixtures into a canopy.

Mr. McLaren: I believe the correct place for cut-outs is in a properly made cabinet, so arranged that you can tell just where a difficulty lies, in case one arises.

Mr. T. F. Grover, of Wauwatosa: There is no excuse for any central station getting poor wiring done at this day. The man that has his building wired, wants it safe, and if told by the manager of the electric company that it is not safe, he is not going to accept it, and there is no reason why we should connect that up. There are not many stations to-day allowing poor wiring to go in, although there have been many in the past.

A voice: Lots of them now.

Hair Grows Out Thicker After the X Rays Remove It—Effect on the Eyes.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have nearly recovered from the effects of the X ray. Wherever the ray affected the skin or hair the result has about disappeared except where the action was exceptionally severe.

Hair began to grow, in my case, in about nine weeks from the time it fell out; it came in thicker than before, but this may be simply due to the skin being more healthy. I have noticed this much, however, that working around X-ray tubes encourages the growth of hair if the action is not prolonged too much. This may be due to the presence of electricity under high tension, as it is known that static electricity has an effect somewhat similar to this.

The effect of the ray upon the skin seems to take a much longer time to disappear, but gradually does so.

I have been obliged to keep away from the tubes altogether on account of the effect on my eyes, the ray affecting them very much. I used glasses for some time, but they did not seem to have much effect.

Whatever causes this action on the tissues, whether it is ultra violet light on an electrical action, or a combination of both, it is certainly very interesting and, no doubt, will be turned to some use. It may have a beneficial effect in some skin diseases. It certainly will have some effect, but whether for good or bad is a matter of experiment.

H. D. HAWKS.

Tarrytown, N. Y., February 8.

M. B. Leonard, superintendent of telegraph, Richmond, Va., and widely known as an expert electrician, died last Friday of a cancerous affection of the throat. He was being placed on General Manager Stephens's private car, to be removed to New York for treatment, when he was found to be in a sinking condition and soon expired.

LATEST NEWS.

The Westinghouse company received at Pittsburgh on last Saturday a very substantial order. It was for 450 street-car motors for the West End Electric Street Railway, of Boston.

The Metropolitan Street Railway Company pleaded not guilty in the Court of General Sessions, New York, to the indictment for maintaining a nuisance at the Fourteenth street curve. Further time was granted.

Judge Henderson, on Saturday, appointed W. H. Traner receiver of the Lincoln, Ill., Street Railway Company. It is bonded for $50,000, and controls six miles of track. W. H. Patterson is president; B. W. Kuhn, secretary and treasurer, and L. W. Senseney, general manager.

The Billings & Spencer company, of Hartford, have brought an infringement suit against the Van Wagoner company, of Cleveland, Ohio. The Van Wagoner company has been selling an electric dynamo which is claimed to be the same patent as that of the Billings patent.

The recent sale of $650,000 North Chicago City Railway second mortgage bonds to Vermilye & Company, New York, makes a total issue of bonds and stock by this North Chicago Street Railway and North Chicago City Railway in last 12 months of $3,718,000. This makes present capitalization $14,730,900, exclusive of $250,000 in the treasury.

At the meeting of the Brooklyn Bridge trustees at noon on Monday of this week, William Berri was elected president and C. A. Henriques, vice-president. The expert's report on running the cars of the trolley and elevated railways over the Bridge was made, and stated that it was "wholly feasible and practicable." A committee of three was appointed to consider the report.

GENERAL NOTES.

New Hampshire law-makers are debating just now over eight street railway bills introduced in the legislature. Nearly all of them are for new charters.

The Electrical Exchange, of St. Louis, is enjoying an unenviable notoriety just now over a banquet that concluded, it is reported, *a la* Seeley, of New York.

The New York Accumulator and Electric Company is sending out a descriptive catalogue of its electric heating apparatus. An electric hot-water bag is a specialty.

Mr. John T. McRoy, the conduit manufacturer, of Chicago, sends to his customers each month a calendar blotter containing an interesting seasonable quotation. It is also mentioned that his conduit is not affected by the changes in temperature.

Death of Ferraris.

Signor Galileo Ferraris, the distinguished electrician and a member of the Italian Senate, died in Rome on Sunday.

ELECTRICAL SUPPLIES.

BY W. W. LOW, BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION, JANUARY 21, 1897.

Your worthy secretary invited me to read a paper on electrical supplies, and in an unguarded moment I consented.

This subject is to me a great question and deserves an abler speaker.

The electrical supply houses have, in the past few years, shown a wonderful development. You will all remember when such a business meant a jobbing house carrying wire, insulators and tools, electric bells, batteries and push-buttons galore. They were especially strong on push-buttons. The line for the electrical lighting interests could have been covered by a list of 25 articles.

The parent companies, manufacturing dynamos, etc., controlled and sold all sockets, cut-outs, transformers, incandescent lamps, and, in fact, all the thousand and one articles that now go to make up a complete line of electrical supplies.

We all like to talk of the good old days, but I doubt if any of my friends here would be willing to go back to the period when, for instance, they were compelled to pay $1.25 for key sockets, 75 cents to $1 for single-pole wood cut-outs, which cost about seven cents to make; and as late as 1888, $4 per light net for all sizes of transformers, and 80 cents for incandescent lamps in 1,000 lots.

It was at about this period that the more progressive of the supply houses began to recognize the fact that electric lighting offered the greatest field for development, and that these interests, providing that they could obtain their apparatus and supplies at a reasonable price, would become commercially successful. With their advent into the field, and with the competition occasioned thereby, prices took a downward turn; and, in consequence, you are now buying key sockets, not for $1.25, but for 10 cents—not a cheap, single-pole, wood cut-out, but a high-grade, double-pole, 10-ampere, covered porcelain cut-out, at 10 cents, and all other supplies in like proportion—and as a result the central station man and the stockholders are prosperous, and each year sees them increase their plants and their revenue.

In fact, we have always had the interests of the lighting companies so much at heart that we have to a large extent lost sight of our own. Instead of the cental station paying outrageous prices for their supplies, these goods are to-day sold at a closer margin than any other line of supplies. It has come to the point where we are practically in the same position that the lighting companies were when we came to their rescue, and it would not be more than fair for the managers here assembled to form an organization for the advancement of prices. I speak feelingly on this subject, for we are not able to follow the advice of one who will never be forgotten as long as the Northwestern Electrical Association exists, and who has gone to meet his reward, and "bond the plant," for, unfortunately, a supply house has no plant to bond.

I suppose that you have troubles of your own, but it has been so long since I have had such a good chance to tell of those of the supply business, that I can not resist taking advantage of this opportunity.

Take the question of credits, for instance. You will hardly be prepared to believe it, but I do not hesitate to state as a fact, that there are central station buyers who expect, or at least take, 60, and even 90, days to pay accounts, and expect to get the same prices as though they paid promptly. The supply man has to meet his bills promptly, and if he paid them with the same irregularity of his tardy customers, he would expect to pay heavily for his negligence.

Then, while on this subject of troubles, how would you fill an order like this:

"Send up 1,000 feet No. 10 wire; must be here to-morrow morning sure." This received just before closing and just in time to get to the depot. Now, there is more than one kind of wire; which to send is the question; bare copper, rubber-covered or weatherproof. We use our best judgment and send the rubber-covered; it comes back the second day, accompanied by a letter, from which, among the vigorous remarks, we find that weatherproof was wanted.

Another case which your speaker remembers as of recent happening: A message was received about 5:30

RESULT OF INCLOSING THE ARC AIR-TIGHT. BLACKENING AT LOW VOLTAGE OF ARC.

P. M., as follows: "Send one barrel of Packard lamps; must be shipped to-night." You are aware that lamps are made in three standard bases, several irregular, and voltages too numerous to mention. We look up his last order and find it was for 110-volt, Edison base, and ship accordingly. Ten o'clock next morning we receive a message of 20 words, which, by the way, was collect, saying that, as their last order was for 110-volt, we should have known that 52-volt was wanted.

So much for troubles. Now, it may not be out of place to say a few words about the part the customer may play in having his orders filled correctly and promptly. The first and most important is that of having the order written plainly with a concise, and yet full, description of the articles, one article to a line and not in the middle of a long letter, so that it may be unnecessary to call upon either the expert in writing nor the mind-reader, who are always the overworked members of a supply house.

All houses in this branch of business close Saturday afternoon, which, though widely advertised, is evidently a fact not understood by all, as the number of rush orders received after closing hours now testify.

There are bright sides to the electrical supply business, however, and these the speaker would be glad to more than briefly mention were it not for the fact that this paper has already taken up too much of your time.

One great advantage they have over supply houses in other branches of business is in the bright and intelligent class of men who make up their list of customers. Then there is the daily appearance of new inventions, appliances and improvements about which the supply man must at once become posted, so as to be able to advise and counsel his customer in regard to same.

The corps of men upon the road, too, must be, and are, more than mere sales agents, as in other lines. They have to be posted in both the theory and practice of electricity, and are men who are always ready and willing to give advice or to take off their coats and help in an emergency.

Another bright side is the pleasure we derive from the privilege of belonging to such associations as this, and in attending their meetings, the only drawback of this being, I have found, in the necessity of appearing so profoundly dignified on such occasions.

In conclusion, while we may not claim that the supply man is at once the guide, philosopher and friend of the central station manager, it is entirely correct to say that their interests are in many ways identified. The prosperity of one is largely reflected in the prosperity of the other. There are many ways in which they can work together to their mutual well being, in discountenancing bad practice in their trade relationship.

There is no room in the electrical supply business for bargain-counter methods; that the "best at any price is the cheapest" is, if anything, more a truism in the lighting than in most other enterprises, and I am pleased to be able to compliment the members of this convention on representing a class of buyers who clearly appreciate this fact.

Electrical supplies have been and are in a transitory state, some rapidly becoming recognized as standard, others falling in the rear.

I predict that in a few years it will be much easier than at present for the central station buyer to know just exactly what he wants for every purpose, and what the price should be. We, all of us, have work to do in bringing about this happy condition.

Mr. Low stated, in addition, that in regard to slow accounts 75 per cent of the central station accounts of that character are municipal accounts. Some are very prompt, but the majority are slow. He believed that between 30 and 35 per cent of the orders received by his house (and that includes traveling men's orders, too) have to be held until further information is secured, because the orders are not given explicitly. The size or number, or something like that of importance, is omitted, and it frequently takes two or three days to get the necessary information.

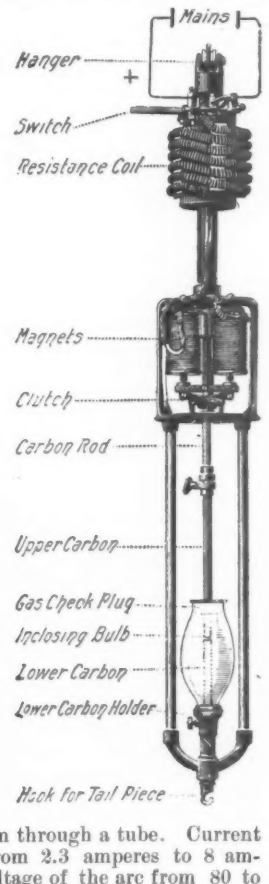
THE INCLOSED ARC LIGHT.

DELIVERED BEFORE THE SOCIETÉ INTERNATIONALE DES ELECTRICIANS, PARIS, FRANCE, JANUARY 20, 1897, BY L. B. MARKS, M. M. E., OF NEW YORK CITY.

(Continued from page 59.)

2. Iodine: Tincture of iodine placed in a small glass immersed in sand in bottom of cylinder. Current ranged from 5.5 to 8 amperes in different tests; voltage of arc from 70 to 75; voltage of mains, 120; minimum length of arc, 2.79 millimetres; maximum, 3.17 millimetres. It will be noted that the action of iodine is somewhat similar to that of hydrogen, the tendency being to increase the resistance of the arc and thereby shorten the latter; the effect, however, is not as marked as in the last case.

3. Chlorine generated in the usual way and admitted to the cylinder from the bottom through a tube. Current ranged from 2.3 amperes to 8 amperes; voltage of the arc from 80 to 96 volts; length of arc from 6 35 millimetres to 36.32 millimetres. It will be noted that in this case the results are entirely different than in the other two. The presence of chlorine reduced the resistance of the arc greatly, so that at 2.4 amperes and 80 volts the length was 6.35 millimetres, while at 8 amperes and 96 volts the length was over 36 millimetres.



Following are some of the results with impregnated carbons.

First, sodium carbonate ($NaCO_3$): Carbons which had been soaked over night in a solution of $NaCO_3$ gave a steady arc for two hours at 8.5 amperes and 35 volts, after which, for the same length of arc, the voltage increased appreciably, until the effect of the solution disappeared entirely. The deposit on inner wall of cylinder after two hours was thick and had a tendency to crack the glass. The ordinary foreign and American cored carbons have sodium carbonate in their cores and give similar results to the above, though less marked.

Second, ammonium chloride (NH_4Cl): When carbons were saturated with NH_4Cl, the arc was over twice as long at same voltage as in last case. NH_4Cl evaporated at a

comparatively low temperature, but decreases the resistance of the arc and leaves practically no deposit in the bulb. The lower part of the cylinder became coated with condensed vapor shortly after the arc was started, but as soon as the heat became intense enough, this formation was dissipated and the glass became perfectly clear. At the end of a four hours' run the extreme lower end of the cylinder was slightly coated with a yellowish green band.

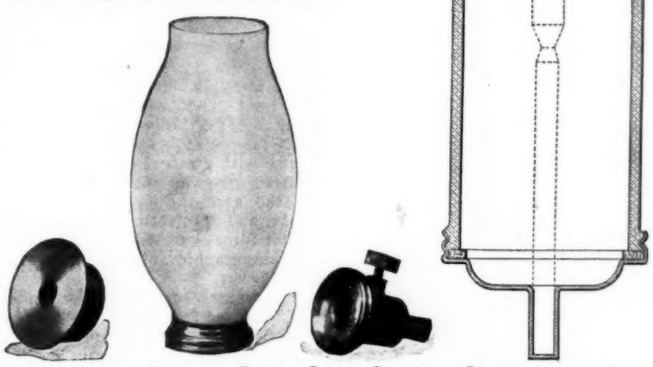
Third, magnesium oxide (MgO): $MgCO_3$, when used as a core of the negative carbon, is converted by heat to MgO, CO_2 gas being driven off. The CO_2 is disassociated at a comparatively low temperature, and, as may be expected, the voltage necessary for a steady arc is quite low. For 15 minutes the potential difference of the arc ranged from 40 to 45 volts with a current of eight amperes, the arc meanwhile being quite steady; the area of the crater was about eight square millimetres. The decomposition of the $MgCO_3$ was marked by a series of slight and almost inaudible explosions; finally a hard bead of MgO was left at the tip of the negative. This bead was extremely refractory; it did not succumb to the heat of the arc, but persisted as an incandescent globule from which the arc stream seemed to issue. The potential difference of the arc varied from 44 to 50 volts at 8.5 amperes, the arc being quite steady for almost an hour; there was no appreciable coating on the internal surface of the cylinder. Occasionally a slight greenish hue was noticeable in the arc.

For comparative purposes, different types of carbon points, all practically alike as to purity, but varying in granular structure, were tried. The following combinations were tested: First, lamp-black molded; second, lamp-black squirted; third, gas-black molded; fourth, gas-black squirted; fifth, petroleum coke molded; sixth, petroleum coke squirted. The results were practically the same for all structures of carbon.

The tabulated data show that for the same current and length of arc, the potential difference at the carbon points will depend upon the surrounding atmosphere as well as on the constituency of the electrodes. The fall of potential from one carbon to the other follows, in general, the well known law, the major portion of the drop (for short, steady arc) being from the positive carbon to the arc stream. There was one experiment, however, which gave very surprising results, and which is deemed worthy of mention in this connection, as the phenomena observed seemed to constitute an exception to the rule. A steel nail was driven into a hollow negative carbon as a substitute for the core. The sharp end of the nail projected just above the tip of the carbon. A solid positive carbon was used. When current was passed, there were brilliant scintillations due to incandescent steel, followed by fumes which coated the internal wall of the chamber with a dark reddish deposit of FeO. A molten steel ball soon formed in the concavity at the tip of the negative. The length of the arc was between three and four millimetres, current being from eight to nine amperes, and the potential difference at the arc varying from 20 to 30 volts. The negative was intensely hot, while the positive was comparatively cool. The area of the crater in the positive was about one square millimetre, or about one-eighth of that in the other cases. The arc, expanded in cross-section at the negative and tapering at the positive, darted from point to point across the projecting surface of the upper carbon, sometimes jumping a distance of five or six millimetres to select a path; meanwhile the negative glowed with constant brilliancy. The arc always played from the side of the molten steel ball, the latter often spinning like a top, seemingly in unison with the arc. The results of this experiment seemed to indicate an accidental reversal of current, but subsequent tests showed that no such reversal occurred.

BLACKENING OF THE INTERNAL SURFACE OF INCLOSURE.

Before taking up the analysis of the latest development of the art, let us pause for a few moments and examine into the underlying principles governing the successful operation of inclosed arcs of to-day. Let us start out with the operation of an inclosed arc within an air-tight compartment, to which the outside atmosphere has absolutely no means of communication. The photograph I give herewith represents such a structure and illustrates the results which follow the passage of current. I shall show you the stereopticon view of the apparatus on the screen later on. You will note that the glass, which was originally cylindrical, now has a large spherical protuberance at the side. You will also note that the chamber is coated on the inside with a heavy black deposit. This apparatus was originally air-tight and the carbons in contact. Current was passed so as to form an arc, and in due time the length of this arc increased from 0 to about 9 millimetres, as the carbons consumed. The bulb began to blacken after the oxygen contained in it went into chemical combination with the carbon vapor of the arc stream. Such a result is natural, as the disintegration of carbon must go on as long as the arc plays; the carbon having no substance with which to combine, is thrown off in the form of a black soot on the internal wall of the chamber. Moreover, as in this case, when there are no means of exit for the expanded gases, the pressure is sometimes sufficient to distend and rupture the envelope.



GAS-CHECK PLUG. (Fits in mouth of bulb.) INCLOSING BULB. (Surrounds the Carbons.) LOWER CARBON-HOLDER. (Supports the bulb.) INCLOSURE WITH GAS-CHECK PLUG.

Although the blackening of the internal wall of the chamber always follows the operation of a carbon arc in an air-tight inclosure, the same discoloration may occur under other circumstances when the inclosure is not air-tight, or even nearly so. This second case is illustrated in a cylinder in which the annular space around the entering carbon permitted of access of oxygen to the inclosure. The blackening was due to a large current and a short arc. In the photograph I have placed a clear cylinder alongside of the other for comparative purposes. You will note that the deposit is inky in color and quite uniformly distributed over the surface of the glass. In this case the carbons were burned for three hours at a current of 18 amperes, the arc tension being 30 volts. The amount of impurity in the carbons was inappreciable.

Having thus reviewed the fundamental conditions governing the operation of inclosed arcs, we will now confine our attention to the most important phase of the subject; namely, the high-potential inclosed arc.

"PIONEER" (MARKS) HIGH-POTENTIAL INCLOSED ARC LAMP.

We have seen that all the types of inclosed arc lamps described up to this point have been deficient in various particulars. As far as commercial operation is concerned, none of them has been a success. It remained for a lamp operating on a new principle to fulfill the requirements exacted by the commercial practice of the day. Such a lamp had to satisfy the following conditions:

1. Standard steady light of uniform distribution.
2. Efficient arc.
3. Long life of the carbons.
4. No blackening or discoloration due to the disintegration of the carbon.

These conditions were fulfilled in a lamp, an account of which I presented for the first time before the National Electric Light Association of America in February, 1894, and which I called the high-potential incandescent arc. The high-potential inclosed arc, as its name indicates, was so called on account of the high voltage of the arc. High voltage is, of course, a relative term, and is applied in this case in contrast to the usual voltage of the arc; viz., 40 to 45 volts. In experimenting in this line, I found that arcs could be steadily maintained at double the voltage of the ordinary arc, and, under some conditions, even at three or four times the voltage. Arcs of such high voltage are naturally quite long and require apparatus specially adapted to operate them. I found that under proper conditions these long arcs could not only be maintained continuously, but so operated with a remarkably small current, thus resulting in high efficiency and long life of the electrodes. Experience has shown that this method of operation is the only one which has been successfully applied to existing commercial circuits. A glance at the cut, in which marginal notes indicate the principal parts of the lamp, will show that the operating mechanism consists simply of a pair of solenoids, armature and cores, lazy clutch and carbon rod. This mechanism is designed so as to spring a long arc of about 10 millimetres or more. The design of the solenoid is such that the current consumed by the lamp will be very small and quite uniform throughout the range of the lamp. The inclosing bulb is mounted in the lower carbon-holder, and, as will be seen from the notation on the cut, is closed at the top by a special device known as a gas-check plug. The lower carbon in this lamp is 12 centimetres long and the upper carbon 30½ centimetres long; both pencils have a diameter of 11.11 millimetres. At the top of the lamp is mounted a small resistance coil. The standard lamp is designed to pass a current of from four to five amperes, 80 to 85 volts being the drop across the arc.

THE GAS-CHECK PLUG.

The plug which forms a closure for the bulb is such a unique device that I have deemed it worthy of a special representation in another cut, where you will note the gas-check plug is shown in cross-section mounted in the mouth of a cylinder. If we close the mouth of the bulb, simply by a flat metal disk having an opening in it sufficiently large to allow for variation in diameter of commercial carbons, we find it difficult to prevent an abnormal access of oxygen into the inclosure. The gas-plug was devised to check the circulation of ingress and egress and still have the same sized opening leading into the inclosure. The comparative measurements with and without the gas-checking device will be given later on.

It will be noted that in order to retard or check the flow of gases into and out of the bulb, the plug is provided with a depending cylindrical metal tube about one and one-half centimetre long, the lower end of which is slotted so as to allow of communication between the gases on either side of the wall formed by the tube. The opening around the carbon may, with advantage, be enlarged so as to form a secondary chamber for the gases, as shown in the cut. Now, after the lamp has been in operation for a few moments, the heated gases from the arc, instead of having an unobstructed egress, are met by another body of gas at the plug, resulting in the production of eddy currents, which tend to check the circulation of the outgoing and incoming gases. I have in my hand a model illustrating the principle of the gas-check plug. Instead of the lower carbon, I use an ordinary wax candle. Instead of the upper carbon, I use a strip of metal to serve as a longitudinal diaphragm adapted to show the circulation of the gases. The depending cylindrical metal tube which projects into the bulb is provided at its lower end with slots, just as explained before. In order to show the gas-checking action very distinctly, I have arranged to open and close the slots at will. The conditions, you will see, represent exactly those which exist in the case of the lamp. I now light the candle. If I remove the metal strip which forms a dividing wall for the gases, the circulation of air into the inclosure will be stopped almost instantly, and the candle goes out. If the strip be inserted, thus representing the upper carbon in its normal position in the lamp, and the candle be relighted, you will note that the flame continues to play, the cool air finding a path for admission on the one side, and the heated gases having an unobstructed egress on the other. Thus far the slots in the depending tube have been closed. I now open these. You will note that the circulation of gases is quickly checked, and the flame grows dimmer and finally becomes extinguished.

(To be continued.)

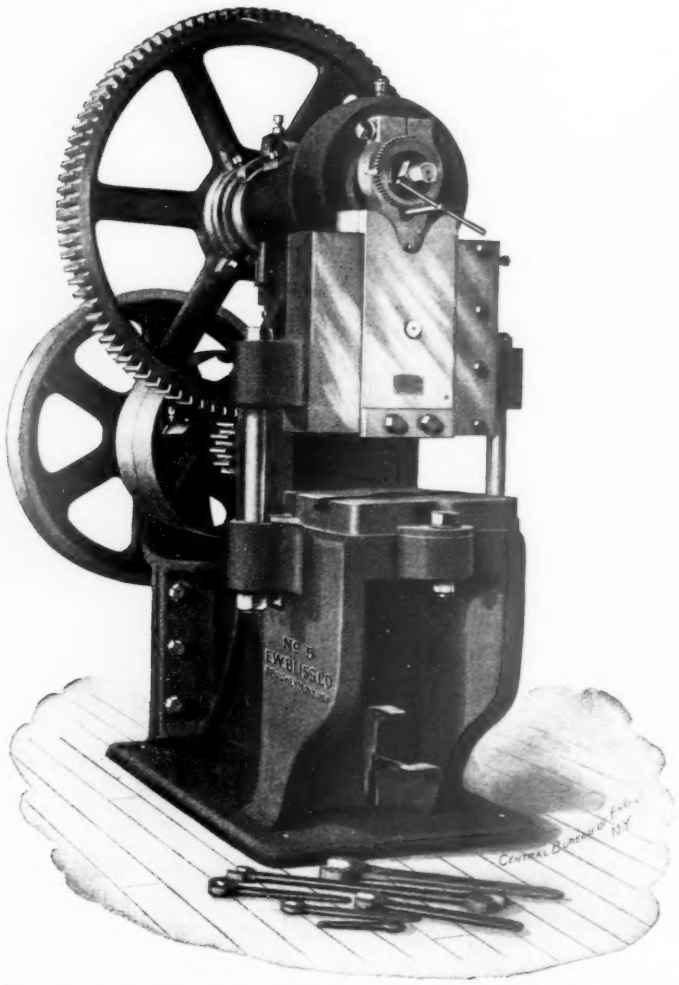
Stiles Punching Press Geared With Stay Rods.

The illustration herewith shows a modification recently made by the E. W. Bliss company, Brooklyn, in their standard No. 5 Stiles geared press, in order to give more rigidity to this press when heavy work is done in it. By means of these stay-rods the press is made to combine the advantages of the overhanging frame with those of the straight-sided pattern. These stay-rods can be removed when using the press to cut out of the full sheet, when they would be in the way. The stay-rods are especially desirable when the press is used for embossing heavy stamping and shaping. This machine is otherwise provided with the well known features of the Styles presses; namely, the Styles graduated eccentric adjustment and the Stiles clutch, and is built in an exceedingly solid and accurate manner. Its principal dimensions are as follows:

Size of opening in bed, 11 by ¼ inch; distance back from center of slide, 10½ inches; distance from bed to bottom of slide when stroke and adjustment are up, 9 inches; standard stroke, 1½ inch; weight of fly-wheel, 900 pounds; proportion of gearing, 1 to 7; floor space over all, 52 inches by 86 inches, and weight complete, about 9,000 pounds.

The range of work for which this press is adapted covers nearly every kind of blank cutting, punching, perforating, forming and bending, including a large proportion of the operations needed in the manufacture of hardware, locks, cutlery, guns, sewing-machines, typewriters and many other articles made out of sheet-metal. In electrical work it is especially adaptable in all cases where a machine is required for heavy punching, etc.

The "Stiles Patented Graduated Adjustment" is an especially valuable feature of this machine, the graduation being marked to $\frac{1}{100}$ of an inch on the eccentric disk, enabling the operator to keep an exact record of the dies and set them without loss of time.



New Punching Press, Especially Adapted for Heavy Electrical Work.

THE AUXILIARY TUBE.

A RECENT FORM OF CROOKES TUBE.

For the reason that so many views exist as to the most desirable form of Crookes tube, much space has been given in these columns for the discussion of the various types, and Messrs. Green & Bauer, Hartford, Ct., send us the description of still another form, known as the "auxiliary" tube, which embodies several theories, which is said to produce excellent results when used on coils of from four to ten-inch sparks. In the description kindly furnished, Mr. Green says: "In our earlier experiments (to prevent the vacuum from rising) we used such devices as a small cathode of aluminum (as well as many other metals), in addition to the ordinary aluminum cathode and platinum anode, with the idea of reversing the current through the two aluminum cathodes, producing aluminum oxide gas, and in that manner lowering the vacuum within the tube. After trying countless experiments, we designed a tube with a cigar-shaped bulb, having the anode and cathode (of the reflecting type) about two and one-half inches apart, and the outer terminals about five inches apart. At the upper, or anode, end we attached a round bulb connected to the main tube by a narrow neck or opening, and at the cathode end we placed the stem.

"The auxiliary bulb operates in the following manner: When the tube is exhausted, the normal amount or percentage of ether molecules are present in the main tube, and a like quantity in the auxiliary bulb. Now, it is a well known fact that these molecules are thrown more rapidly and with greater force from a heated surface, and where the chamber is small, allowing the reflecting anode to be near the focusing point on the glass, the molecules encounter less resistance and are, consequently, thrown with greater force against said focusing point in the bulb, disturbing the surrounding molecular elements and projecting them with greater force against the fluoroscope, or photographic plate, giving a stronger ray.

"The extra supply of ether molecules received from the bulb into the tube cause the anode to remain hot longer, and, when sparking begins on the outside, can be obtained by heating."

Mr. Geo. W. Conover.

A Compliment to the Hard-Worked Catalogue Man.

[*London Electrician.*]

Our American friends are past masters in the gentle art of catalogue compiling. The best productions of our own engineering firms are, we think, more business-like—that is to say, the intending expert buyer is more likely to find in them exactly what he wants. The type of American catalogue which we have in mind appeals, however, with far greater force than any issued in this country to the potential, non-expert purchaser of electrical material.

LITERARY.

The *North American Review* for February gives space to a most timely and interesting paper on "South Africa and Its Future," by John Hays Hammond, whose connection with recent stirring events in the Transvaal is well remembered. Mr. Hammond enters fluently into a description of the country, particularly of its vast mineral resources, and predicts for it a general prosperity that will be further enhanced by the establishment of customs' unions and a confederation of the South African States.

The Conover-Goe Company, of Chicago.

The gentlemen interested in this company bring to it years of experience in the electrical business. Mr. George W. Conover was for many years the buyer for the old Electrical Supply Company. His associations with this company brought him into personal contact with the leading manufacturers of electrical and hardware specialties. The acquaintances thus formed have since been added to by several years of activity in selling electrical supplies. It is a rare thing to find the qualities of a good buyer and a good seller combined in one person, but Mr. Conover's business career seems to warrant the assumption that he has the two talents strongly developed.

Mr. D. E. Goe has been identified with electrical development, as he expresses it, ever since he was "knee high to a duck," having made an application for patent on sundry improvements when only 13 years old. His actual work began with the unpoetical occupation of scooping out telephone post-holes under the direction of the late Wiley W. Smith, one of the pioneer telegraph and telephone men. Various promotions brought him to the position of State superintendent for the Southern Telephone and Telegraph Company. About this time electric lighting was claiming a large share of energetic talent, and Mr. Goe became engaged in the installation of isolated plants. In 1890 he was asked to assume the duties of advertising manager for the

Mr. D. E. Goe.

Electrical Supply Company. For the last two years he has been manager for the Central Electric Company and has also directed the progressive and always attractive advertising of this company.

The Conover-Goe company have contracted for the entire output of electrical and hardware specialties manufactured by the C. H. Dickey Tool Company. Other lines controlled in western States are made by the Paragon Arc Lamp Company, Boston, Mass.; the line of Hartford switches, made by the Gibbs Electric and Manufacturing Company, of Hartford, Conn.; porcelain specialties, rubber goods and insulated wire, made by C. S. Knowles, Boston, Mass. Other important deals are about to be consummated, and we have no doubt that the affairs of the Conover-Goe company will at once assume a gratifying and profitable proportion, and the many friends of the gentlemen interested, including the Electrical Review, wish them all possible success.

Heavy Machines Electrically Driven.

The accompanying illustrations show two forms of the heaviest machines recently constructed by Hilles & Jones, Wilmington, for operations by electric power. These machines were made for shipment to Russia. Illustration, Fig. 1, is a very massive combined punch and shears, capable of making a six-inch hole in ¾-inch steel. The frame is

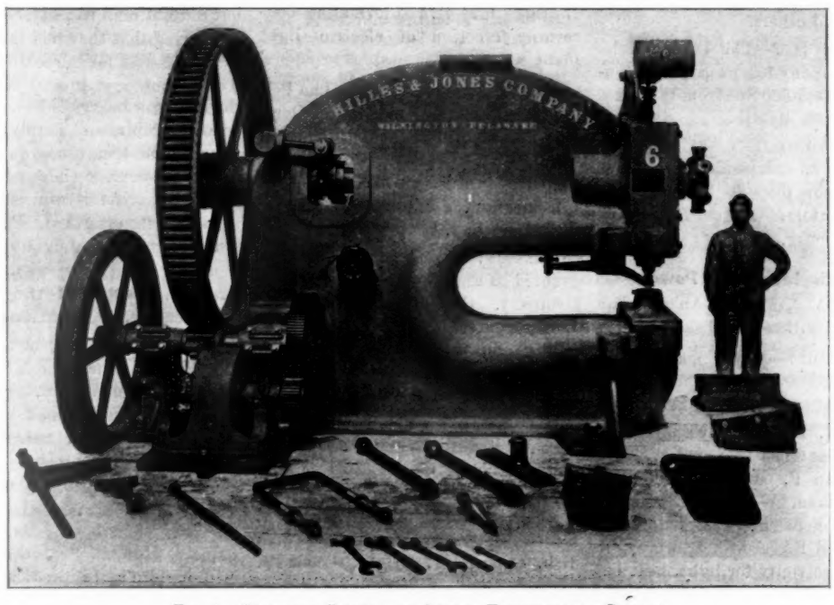


FIG. 1.—COMBINED PUNCH AND SHEAR, ELECTRICALLY DRIVEN.

of box form and weighs about 4,000 pounds, and is a single casting. The knife blocks are secured to the nose and sliding head by through bolts and tongues, so that they are moveable. The sliding head is counterbalanced through a spiral spring, and has a tapered brass shoe for taking up the wear. The spur-wheel is large, with turned shrouds, the clutch which engages with this being controlled by an improved adjustable automatic stop, which allows the sliding head to be brought to rest at any desired point of the stroke. The motor is mounted on an extension base connected to the main frame, and drives onto the flywheel shaft through a pair of cut gears. This method of construction takes up but very little floor space, considering the capacity of the tool, and makes it entirely self-contained. It avoids also any pipes or belting which might interfere with overhead traveling cranes.

Illustration, Fig. 2, shows a set of bending rolls on plates up to three-quarters of an inch in thickness. A feature of this machine is that the driving is done by two motors, each of which is controlled by a reversing rheostat. The bottom roller is driven by the larger of the motors through a series of gears, and the top roll is raised and lowered by the smaller motor.

The Hilles & Jones company do not make the motors, but say that they have found that this class of machinery, which has intermittent duty, requires the most substantial motor. At the time the work is being done, especially on such machines as punches and shears, there is a momentary slowing up, which, of course, throws more current through the motor. As a general rule, for this class of duty, they find the compound-wound motors most serviceable. For punches and shears especially, the speed is constant; with bending and straightening rolls, some variation would be immaterial. They say they have used a number of different motors for this class of work, among them being Westinghouse, General Electric, Gibbs, Story and Crocker-Wheeler.

Freeman Sentenced.

Walter K. Freeman, the electrical engineer who was convicted of assaulting Sarah E. Work when she was only 15 years old, was sentenced last week by Justice Smyth to seven years and nine months' imprisonment. Freeman was tried before for this crime and convicted and sentenced for 10 years.

His counsel obtained an order from Supreme Court Justice Pryor the same day to show cause why a stay and certificate of reasonable doubt should not be granted in the case. The order is made returnable this week.

The Outlook.

[*From Boston News Bureau.*]

With trade slowly growing, with ease in money assured by the plethora of bank reserves, with financial sentiment improved by reason of the utterances of the coming Secretary of the Treasury, and with the general outlook clearer than has been the case for a number of years, it is difficult to see how an era of activity and higher prices can be much longer delayed.

The floating supply of investment securities is becoming materially reduced. Attention is being directed to those properties which have been successfully reorganized, and herein possibly lies the great speculative opportunity.

The Chicago Electrical Association.

The following is a list of special papers by members of this association, with dates of presentation:

February 5, "The Telephone Situation," W. Clyde Jones, lawyer.
February 19, "Vacuum Tube Lighting," M. A. Edson, of Chicago Telephone Company.
March 5, "Electrical Resonance," Kempster B. Miller, of Western Telephone Construction Company.
March 19, "Cable Testing," Geo. D. Hale, of Western Electric Company.
April 2, "Requirements of High-Speed and Heavy Electric Traction," Hayward Cochrane and E. J. Swartout, electrical engineers
April 16, "Arc Lighting in America and in Europe," C. Wiler, of Western Electric Company.

The officers of the Chicago Electrical Association are: S. G. McMeen president; F. S. Hickok, vice-president; E. J. Jenness, treasurer; J. R. Cravath, secretary. Directors, W. Clyde Jones, G. W. Knox, Kempster B. Miller.

ELECTRIC LIGHT FLASHES.

A meeting of the Citizens' Light and Power Company, of Rochester, has been called for February 23 to consider the proposition to increase the capital stock of the corporation from $150,000 to $400,000. If the capital stock is increased the company will enlarge its plant and bid for street lighting.

The annual report of the Edison Electric Illuminating Company of Boston states that there has been no increase in the capital stock during the year, but, to provide additional capital for conservative development purposes, the stockholders, on December 10, voted to increase the capital stock by an issue of 5,000 shares. During the year $130,000 debenture certificates were converted into stock; there remains of this issue $178,000 now outstanding, the convertible privilege attaching to which expires May 1, 1897. The figures of operation show:

Year, Dec. 31.	1896.	1895.	1894.
Earnings	$773 478	$709,002	$628,406
Expenses	498,298	456,301	311,242
Net	$275,180	$252,701	$317,164
Inc. lmps. con. cted	131,381	108,476	100,047
Arc. lmps. con. cted	1,422	901	853
Motors con. (h.-p.)	5 354	4,807	4,549

The Boston Edison company's balance sheet at the close of the year was as follows:

ASSETS.

Dec. 31.	1896.	1895.
Installation	$3,245,074	$2,857,218
License under Edison pts	338,105	338,105
Liverpool warf estate	225,912	225,912
Cash on hand	31,260	115,574
Stock on hand	49,803	59,394
Notes and accounts receble	105,894	112,347
Open accounts	15,418	17,702
Total	$4,011,468	$3,706,454

LIABILITIES.

Capital stock	$3,240,800	$3,110,800
Debenture bonds	178,000	308,000
Trust mortgage bonds	180,000	180,000
Notes and accounts payable	185,389	15,285
Interest and dividends payable	58,494	57,519
Rents	....	817
Reserve for maintenance	120,000	....
Profit and loss	48,785	34,033
Total	$4,011,468	$3,706,454

Dissatisfaction among the employés of the lamp department of the Edison-General Electric Light Company, of Harrison, N. J., resulted in an incipient strike in the "sealing in" department, of 40 girls, who were employed in sealing the carbons into the lamps.

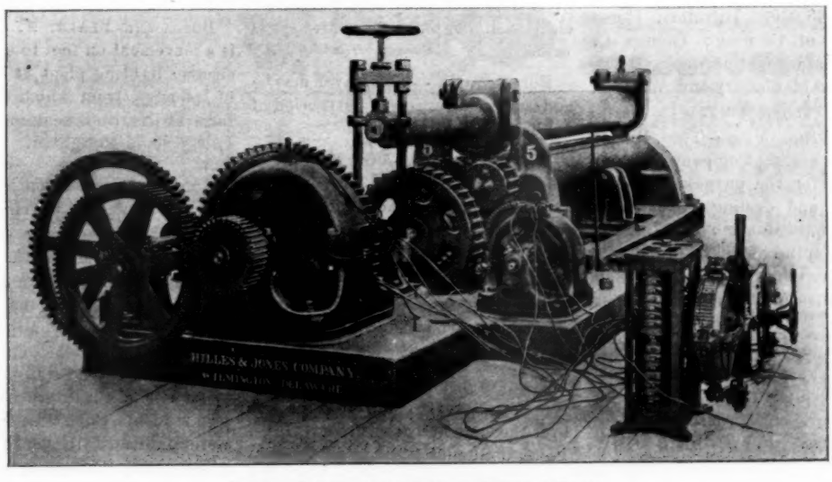


FIG. 2.—ELECTRICALLY DRIVEN BENDING ROLLS.

Closing Up the Affairs of the National Electrical Exposition.

Judge Truax has appointed George F. Porter receiver of the National Electrical Exposition Company in proceedings for voluntary dissolution. There are no creditors, and the assets, $20,000, have been distributed as a dividend among the stockholders.

ADVANCE INFORMATION

New Electric Railways.

AKRON, OHIO—A new electric line is to be constructed between Akron and Cleveland by way of Hudson and Turinsburg.

KALAMAZOO, MICH.—The Michigan Transit Company has secured right of way for its electric road almost the entire distance to Gull Lake.

RED WING, MINN.—The Union Electric Company will extend their line to Red Wing.

TARRYTOWN, N. Y.—The New York, Elmsford & White Plains Railway Company is considering the project of a trolley line from this place to Sleepy Hollow.

WAUKEGAN, ILL.—The Bluff City Electric Railway will build from this place to Cranston, and the fare will be 30 cents from Waukegan to Chicago, a distance of 35 miles.

Business Troubles.

EUREKA SPRINGS, ARK.—A petition for a receiver and attachment suits have been filed against the Eureka Springs electric light, power and ice plant.

CHICAGO, ILL.—The Louis K. Comstock Company made an assignment last week to the Chicago Title and Trust Company. Assets, $52,000; liabilities, $38,000. The company carried on a contracting business for electrical work. Failure said to be due to depression in business.

New Manufacturing Companies.

DENVER, COLO. — The Western Electric Manufacturing Company has been incorporated. Incorporators, B. B. Clawson, E. P. Eppich, L. F. Eppich. Capital, $16,000.

CORNING, N. Y.—The Corning Construction Company has been incorporated to manufacture electricity for producing light, heat and power. Capital, $5,000. Directors, Hosea A. Clark, of Corning; Thomas C. Frenyear, Marc W. Comstock, of Buffalo; Edward Slattery and W. A. S. Chipman, of New York.

PORTLAND, ME. — The Burton Electric Smelting Company has been organized for the purpose of manufacturing and dealing in electrical smelting apparatus and operating the same. Capital stock, $1,000,000. President, George D. Burton, of Boston; treasurer, Henry D. Tudor, of Boston.

ST. LOUIS, MO.—The Blies-Moore Investment Company has been incorporated; capital, $5,000; to manufacture electrical and surgical instruments. F. W. Blies, J. W. Moore, incorporators.

BATH, ME.—A new company, under the name of the Torrey Manufacturing Company, to manufacture patent trolley wheels, has been established here.

New Telephone and Telegraph Companies.

TARRYTOWN, N. Y.—The Westchester Telephone Company is making preparations to extend its lines through Rockland County.

HAZLETON, PA.—A new telephone company has been organized in this city, which expects to operate in Luzerne County. Application has been filed for a charter with the Governor.

WALTON, N. Y.—The Walton Telephone Company, to operate a telephone line in this place, and connecting the villages of Delhi and Deposit, has been incorporated. Capital, $4,000. Directors, S. P. Wilber, George Paine and J. R. Honeywill, Delhi; J. K. Munn, Fred C. Ward, Walton, and others.

PAXTON, ILL.—The Paxton Telephone Company has proposed to construct a telephone line from this place to Roberts via Melvin.

SAN ANTONIO, TEX.—A. J. Moore is building an independent telephone line from this place to Boerne, Kerrville, Comfort, Centre Point and Fredericksburg.

Electric Light and Power.

ROACHDALE, IND.—An electric light plant will be established here.

LIMA, OHIO—Mayor may be addressed concerning proposed construction of an electric light plant.

ISLIP, N. Y.—The Bay Shore Electric Company has been incorporated by Freeman F. Malse, Josiah Robbins, William W. Holse, Selah T. Clock, Eugene P. Strong, John R. Howell and Edward B. Mowbray, to furnish electricity for light, heat and power. Capital stock, $10,000.

MEMPHIS, TENN. — An electric light plant is to be estabiished to light the jail and court-house.

OXFORD, N. C.—A. S. Hall is interested in the construction of an electric light plant.

RED SPRINGS, N. C.—A. B. Pearsall may be addressed concerning the erection of an electric light plant.

NORFOLK, VA.—The Old Dominion Steamship Company will put in an electric light plant and fire apparatus.

FORSYTH, GA.—The Mayor may be addressed concerning construction of an electric light plant.

LANCASTER, KY.—G. M. Patterson & Company have been granted franchise for the establishment of an electric light plant, and they will construct same immediately.

NASHVILLE, TENN. — Hirshberg Brothers will put in an electric light plant for lighting their store building.

NAPA, CAL.—The Clear Lake Electric Power Company has been granted franchise for an electric power line over the county roads through Napa, Pope, Conn and Chiles Valleys from the Solano County line to the Lake County line.

ST. MARY'S, PA.—Steps are being taken looking to the establishment of an electric light plant.

ST. LOUIS, MO.—The County Electric Light and Power Company has asked for an extension of time in which to complete their electric power plant.

CHARLOTTE, MICH. — City Clerk may be addressed concerning proposed construction of municipal lighting plant.

GILMAN, ILL.—City Clerk may be addressed concerning proposed establishment of an electric light plant.

BAY SHORE, L. I.—The newly organized stock company for the lighting of the streets has purchased as a site for the electric plant a building which was erected by Henry L. Brown for a clam factory.

COLLINGSWOOD, N. J.—James W. Eldridge may give information concerning erection of electric light plant.

NEW YORK CITY, N. Y.—The Pelham Electric Light and Power Company has been incorporated. Capital, $100,000. Directors, Charles W. Smith, John T. Boyd, Thomas F. Conville and Joseph A. Spratt, of New York city.

CRESSON, PA.—A charter has been granted to the Cresson Electric Light Company. Capital stock, $10,000. Directors are J. L. Mitchell, Tyrone; William Smith, Galitzin; Murray B. Cartwright, Charles V. Bergh, Tyrone, and Conrad Wendroth, Cresson.

SARATOGA, N. Y.—The Saratoga Gas, Electric Light and Power Company has been incorporated with a capital of $300,000. Directors, Frederick D. Tappen, William Alexander Smith, Charles S. Fairchild, Newman Erb, Osborn W. Bright, Lewis B. Woodruff and William W. Miller, of New York.

ERIE, KAS.—An electric light plant is to be established here.

INDIANAPOLIS, IND.—The members of the Board of Public Works are seriously contemplating the recommendation to the Comptroller of the purchase of an electric light plant for Tomlinson Hall. The light bills of the City Hall, markets and police station amount to nearly $5,000 a year.

BOSCAWEN PLAIN, N. H.—There is a movement on foot to establish an electric lighting plant at the Valley of Industry, from which the county farm at North Boscawen and this village could be lighted.

Another Communication From Professor Perrine.

TO THE EDITOR OF ELECTRICAL REVIEW:

Replying to Mr. R. A. Bagnall, I charged bad faith on the part of the managers of the National School of Electricity because, although they originally agreed to publish the "Lesson Leaves" only as lecture syllabuses for the information of their own students, these "Lesson Leaves" were published in book form and subsequently the copyright was sold, my name being used as one of the editors without my consent and without my having had any effective connection with their preparation as an editor. As I previously wrote you, I reviewed these "Lessons" as they were issued and after they were completed, protesting against certain matter which I found in them, but I was unable to see that my suggestions had any effect upon the true editors, and at the time the National School failed I had already written a letter to the president protesting against the publication of these "Leaves," but did not mail the letter on account of hearing that they had failed before it was possible for me to do so.

I do not now intend to criticise the "Lesson Leaves" either favorably or unfavorably, and simply state that I was in no true sense an editor of them, although I endeavored to act in that capacity, as required.

FREDERICK A. C. PERRINE.

Palo Alto, Cal., January 2.

Annual Meeting of the Standard Underground Cable Company.

The annual meeting of the Standard Underground Cable Company was held January 26, over 90 per cent of the capital stock of $1,000,000 being represented. The old board of directors was re-elected for the ensuing year, among them being one prominent gentleman who entered the board during 1896; namely, Hon. B. F. Jones, of Jones & Laughlin's, Limited, one of the largest iron manufacturers in the United States. The report of the board of directors showed a total business of nearly three-quarters of a million dollars for the year 1896; four dividends of two per cent each were paid out of the earnings for the year, and the remainder was added to the surplus account.

The assets of the company aggregate $1,412,046.06, and the liabilities, exclusive of capital stock, are $106,928.08, while the surplus over and above all liabilities (including capital stock of $1,000,000) is $308,107.19. The prospects for 1897 are considered very flattering, a number of large contracts, aggregating nearly $250,000, being now on the company's books, most of which have been secured since January 1, and covering all classes of this energetic company's products. A specially gratifying feature, pointed out by the board of directors, is that the number of customers on the company's books for the year 1896 is 50 per cent greater than for any previous year. The company's branch offices are managed by experienced men in this line of business; viz., New York office, Geo. L. Wiley, manager eastern sales department, assisted by T. E. Hughes, as manager of the bare and insulated-wire department; Philadelphia office, No. 336 Broad street, E. W. Dugdale, superintendent of construction; Chicago office, The Rookery, J. R. Wiley, manager western sales department, including St. Louis, Mo., Security Building, with F. C. Cosby as assistant manager.

HOW TO WIRE BUILDINGS

The Book for Wiremen, Electrical Engineers, Contractors, Constructing Engineers, Architects and Students. 162 Pages. Illustrated. Price, $1.50. Sent to any address on receipt of price. Electrical Review Pub. Co., 41 Park Row, New York.

Kindred.... ...Interests

The American Electric Heating Corporation, of Boston, have gotten out a complete revised price-list in condensed form, yet completely describing their improved products. Many improvements have been made in the past year and new items added, while prices have been reduced. Dealers should get the new list and new discounts.

The Iron Clad Rheostat Company, of Westfield, N. J., is sending out a new theater-dimmer price-list, which covers the ground thoroughly and presents a number and variety of styles. There are over 2,500 of these dimmers in daily use, ranging from 1 to 1,440 lights capacity, and a number of these have this company's interlocking device. Theater dimmers are a specialty with this company, and that they are widely known in this line is evidenced by the number and character of their patrons.

The Electric Appliance Company, of Chicago, have just completed the distribution of their calendar and moonlight schedule for 1897. The calendar is a very large and elaborate affair, and the feature of a complete and accurate moonlight schedule makes it useful as well as ornamental. The Electric Appliance Company have tried to distribute these very generally to the western trade, but if any have been overlooked they will receive one of these valuable calendars on application to the Electric Appliance Company, 242 Madison street, Chicago.

The Metropolitan Electric Company, of Chicago, has been given the western agency for the Ham sand-box. This is a new sand-box for distributing sand and gravel on the rails while the cars are in motion, and is used on railroad trains as well as street cars. Omitting the usual valve, and substituting a simple device for equally distributing the material to be used on the tracks, whether it be sand, gravel or salt, this new box is creating quite a stir in the railroad world. The best evidence that the box is a good one is that the company are putting them out on trial, not to be paid for unless satisfactory, and, in addition to this, they are making a very low price.

The Chicago Fuse Wire and Manufacturing Company are sending out a descriptive circular and illustrated price list of tested fuse wire and links. In presenting this pamphlet to the trade, they believe they are more nearly meeting the popular requirements in the matter of illustrations, descriptions and prices than has ever been done before in this line. They are now equipping the testing laboratory with the latest instruments, going to a large expense for this purpose. It is their intention not only to furnish goods at right prices, but to make the product in all respects of the very highest grade, and to sustain their claim that this line of fuse wire and links is the "standard for accuracy."

The Missouri Telephone Manufacturing Company, of St. Louis, are making rapid strides forward, and have secured the second floor of their building, giving them double the capacity. They have equipped their entire factory with new and improved machinery, and are prepared to handle all orders promptly upon receipt. Their new catalogue is just out of press, and is one of the most complete catalogues ever issued on telephones, containing additional information, as well as illustrating and quoting prices on their entire line of goods. This catalogue will be sent free, upon application, to any address, and should be in the hands of all interested in any way with telephones.

The Central Electric Company, of Chicago, is carrying in its Chicago stock a complete line of snap, flush and push switches of the following makes: Hart, Perkins, Xntric, Stevens and C. S., and is prepared to furnish these goods made up in gangs, with any particular finish, to match special hardware. This company is publishing a four-page folder price-list of the Stevens push-button switches, which it states will be gladly mailed to any one in the business, upon receipt of a communication requesting the same. The Scheeffer wattmeters are rapidly meeting with deserved popularity at the hands of the central-station manager, through the energetic efforts of the Central Electric Company, who are pushing this instrument, and who have just compiled a special price-list, which will be mailed upon request to central stations.

The Partridge Carbon Company, of Sandusky, Ohio, occupies the very desirable position of being in the front rank in the manufacture of carbon motor brushes. This company was one of the early ones to realize the great future for this product, and through its refinements of manufacture and progressive methods of bringing this carbon to the notice of the field it has secured an enviable trade that increases constantly. The company is widely represented, the following houses and individuals representing it in the cities named: Mayer & Englund, Betz Building, Philadelphia, Pa.; Smith & Wallace, Hamilton street, Boston, Mass.; Ed P. Sharp, 44 Niagara street, Buffalo, N. Y.; Arthur S. Partridge, Bank of Commerce Building, St. Louis, Mo.; Reger & Atwater, 214 Pine street, San Francisco, Cal.; Central Electric Company, Chicago, Ill.; J. M. Atkinson & Company, 1439 Monadnock Building, Chicago, Ill.; Harry M. Shaw, 126 Liberty street, New York, N. Y.

Electrical Manufacturers, Attention!

Messrs. Toomer, Nunn & Co., Calle de Gante 8, Mexico City, Mexico, are contractors for all classes of electrical work, and for building electric light plants, telephone and telegraph lines, etc, throughout the Mexican Republic.

They desire the names of manufacturers of electrical apparatus and supplies in the United States.

Reference: Bank of London and Mexico, Mexico City.

This company purposes doing a large business in the electrical line, and will carry a large stock of electrical material to supply the trade.

Manufacturers interested should write promptly to the above address.

PROPOSALS.

To Electrical Contractors:

Proposals for Electric Wiring (amended specifications).

Sealed proposals for furnishing materials and performing the labor required for installing the electric wiring and fixtures in the workshop building, kitchen building, laundry building and female employés' building at Ward's Island, N. Y., and frame building for male employés at Central Islip, N. Y., for the Manhattan State Hospital, in accordance with the amended specifications, may be sent by mail or delivered in person, up to 4.30 P. M., February 11, 1897, to the undersigned, at No 1 Madison avenue, New York city, at which time the Board of Managers will receive and open all proposals.

Parties bidding on this work must be persons or firms actually engaged in the electric wiring business, and be able to refer to work of a similar character performed by them elsewhere.

Proposals must be for the whole work, and be accompanied by a bond of an approved Surety Company, guaranteeing the faithful execution of the offer, if accepted

Drawings and specifications may be seen, and forms of proposals obtained, at the office of I. G. Perry, Architect, in the Capitol, at Albany, N. Y., and at the office of the Board of Managers, 1 Madison Avenue, New York city.

The Board of Managers reserve the right to reject any or all bids as they may deem for the best interest of the State.

HENRY E. HOWLAND,
President Board of Managers.

WHITNEY ELECTRICAL INSTRUMENT CO., MANUFACTURERS OF
High-Grade Electrical Instruments of Every Description.
PENACOOK, N. H., U. S. A.

$25.00, $15.00, $10.00,
In Gold, will be paid to the three purchasers sending in the most solutions of this novel Egg Puzzle. Interests and amuses young and old. Requires patience & steady nerves. Send 15 cts. for Puzzle, (2 for 25 cts.) and learn how to secure a PRIZE.
Walter S. Coles, Neave Building, Cincinnati, Ohio.

W. R. OSTRANDER & CO.,
22 DEY STREET,
Manufacturers of
SPEAKING TUBES, WHISTLES, ANNUNCIATORS.
Electric and Mechanical Bells.
FACTORY,
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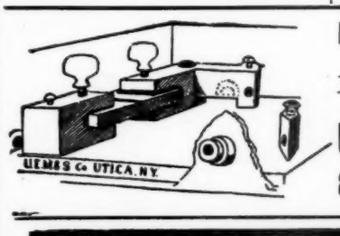

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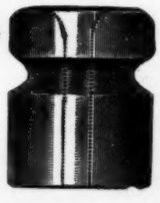


Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED FEBRUARY 2, 1897.

576,082 Automatic switch; John P. Alexander, Jackson, Tenn.—A switch for electric circuits comprising a divided and balanced circuit, switching devices connected in a bridge across said balanced circuit, mechanical means for disturbing the balance of the balanced circuit, and connections controlled by the switching devices for closing a supply circuit whenever the balance of the balanced circuit is disturbed.

576,095 Battery; W. S. Doe, Brooklyn, N. Y.—A battery comprising a carbon cylinder adapted to receive an exciting fluid, a perforated non-conducting tube suspended in said cylinder, a cartridge in said tube comprising a cylindrical anode having an outward opening and a depolarizer in the anode, and a contact with which the anode engages.

576,103 Electric arc lamp; P. H. Fielding, New York.

576,129 Electrical advertising device; L. Julig, San Francisco, Cal.

576,145 Method of, and apparatus for, electric propulsion; L. H. Nash, South Norwalk, Ct.—A vehicle, an electric generator having on its field-magnet shunt and series coils the currents through which flow in opposite directions with a series-wound motor.

576,163 Paste-carrying machine for electric accumulators; F. W. Schneider, Triberg, Germany.

576,164 Construction of cells for electric accumulators; F. W. Schneider, Triberg, Germany.

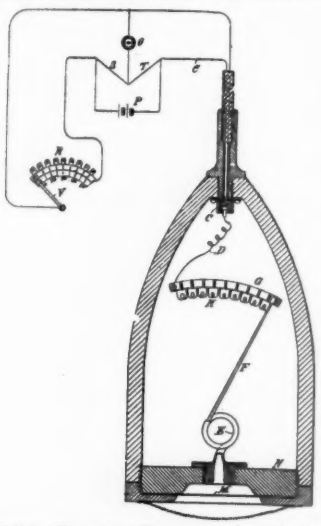
576,166 Automatic block system; J. Shoecraft, Harveyville, Kas

576,176 Furnace for generating heat or power; G. White, Jersey City, N. J.

576,178 Battery plate; T. A. Willard, Norwalk, Ohio.

576,202 Rheostat; H. W. Leonard, East Orange, N. J.—The method of making apparatus in which an electrical conductor is applied to a metal surface, which consists in coating the metal surface with a layer of infusible insulating material applied as a powder and made by heat into a coherent layer adhesive to the metal support, and placing the conductor upon said layer.

576,208 Sounding apparatus; A. M. Lozier, New York, N. Y.—A device for



576,208. ELECTRIC SOUNDING APPARATUS.

ascertaining the depth or pressure of water, consisting of a device moved by variations in hydrostatic pressure, a rheostat varied by the same, a device for indicating variations of resistance due to the operation of the rheostat, and a circuit connecting such rheostat and indicating instrument.

576,240 Electric meter; J. R. Tucker, Aurora, Ill.

576,243 Contact apparatus for telegraphing; C. Vreede, Rotterdam, Netherlands.

576,245 Music-recording apparatus; E. K. Adams, New York, N. Y.—A tank and motor for rotating the same, a platform for a paper sheet mounted therein, a spring supporting the platform and permitting its depression in the tank, and a series of contact trailers resting upon a radial line on said platform, or a sheet of paper placed thereon.

576,266, 576,267 Advertising device; H. Green, Hartford Ct.—An incandescent light globe having a capped or coated surface

INCANDESCENT LAMP ADVERTISING DEVICE.

and provided with a letter or character on one or more of its sides, and also on its end, whereby parts of said globe are rendered opaque by such surface.

576,333 Electrical controller; G. Valley, Johnstown, Pa.—Two movable groups of contacts adapted to regulate the course of the current by engagement with fixed contacts, and an electric switch which affords means by which either group alone, or both of said groups, may be used to supply current.

THE MARTINI LAG AND PIPE WRENCH.

576,342 Electrically operated musical instrument; G. H. Davis, New York.

576,347 Electric heater; F. A. Johnson, Binghamton, N. Y.—A magnetic induction heater, comprising a case having an opening to receive the article to be heated, a coil surrounding the opening, a laminated magnetic shell surrounding the coil, and a connector whereby the heater may be connected to an ordinary alternating-current circuit, and the article to be heated applied in the opening and heated.

576,369 Automatic electric cut-out; C. C. Kritzer, Newaygo, Mich.

576,372 Automatic electric cut-out for magneto bells; J. Z. Miller, Baltimore, Md.

576,375 Spring-jack; W. S. Paca, Baltimore, Md.—A switchboard plug having one or more laterally projecting lugs connected with line wires, a switchboard provided with a socket to receive the said plug freely, the said socket having longitudinal slots with sidewise recesses to receive the said lugs; a longitudinally acting spring within the socket, and electric connections for the socket and spring.

576,383 Alarm for electric circuits; C. B. Sterling, New York, N. Y.

576,384 Brake mechanism and controller for electric cars; W. D. Thomas, Savannah, Ga.—Consists of the regulator or controller shaft provided with a bevel gear, of a horizontal shaft provided with a hand-wheel for operating the same, a mutilated bevel gear mounted on said shaft and meshing with the bevel gear on the controller shaft, the said gears being so timed that, by a single revolution of the actuating shaft, the current may be turned off and reversed.

576,392 Insulator; H. E. Billings, Hartford, Ct.—A line wire supporting insulator stud, a screw-threaded cap having a circuit or ratchet crown teeth; a screw-threaded body portion having a spring-pressed stop-pawl adapted to engage one of said teeth, to prevent loosening of the cap, and a deflector carried by said body portion and surrounding the insulator stud.

576,394 Trolley for electric cars; G. L. Campbell, Shunk, Pa.—A post, a trolley pole pivotally mounted thereon, a trolley wheel carried by the pole, an arm pivotally mounted on the pole, a flexible connection actuating said arm, the connection being attached to the pole, and an idler pulley carried by the post and over which the connection passes.

576,469 Switch plug; W. S. Paca, Baltimore, Md.

576,472 Telephone signal transmitter; E. C. Robes, Medford, Mass.—A signal transmitter in a normally open telephone circuit, or branch, comprising means for sending successive independent arbitrary signals, motor mechanism actuating the same, a telephone hook switch controlling the said motor mechanism, means for closing the circuit round the signal-sending mechanism, and means for closing it through the said mechanism.

576,475 Electric arc lamp; D. A. Shesler, Toledo, Ohio.

576,493 Electrical circuit for operating automatic railway gates; J. S. Biggar, Chicago, Ill.

Martini's Patent Lag and Pipe Wrench.

The Martini patent lag and pipe wrench, shown in this issue, is a new departure in the line of an automatic wrench, and has a number of very desirable features. The movable jaw at the top causes it to tighten as the pressure on the handle is increased. It will not slip, takes hold and lets go suddenly, and is always ready. In the operation of this wrench there is no lost motion, and no time is lost in adjusting. The wrench is made of drop-forged steel, and the jaws of the best tool steel hardened and tempered, and can be replaced when necessary at a very little expense.

This specialty has had the approval of practical men familiar with this class of tools, and is already very extensively used, and promises to be a very desirable specialty, as it accomplishes all the purposes of a much more complicated and expensive tool. The Electrical Appliance Company, of Chicago, have undertaken to put this wrench on the market, and have the exclusive sale for same, and report that prospects for a big business on it are very encouraging.

NEW BRANCH OFFICE FOR BUCKEYE ELECTRIC COMPANY.

ANNOUNCEMENT OF IMPROVEMENTS IN FILAMENT PRODUCTION.

The agency arrangements for Philadelphia of the Buckeye Electric Company, manufacturers of incandescent lamps, Cleveland, Ohio, have been withdrawn, and business in that city in the future will be entirely on the branch-office basis, in charge of Mr. Edward L. Nash, who has been actively identified with this company's New England interests, and the office will carry a well assorted stock of Buckeye lamps.

As the result of a long series of experiments, the Buckeye company has accomplished a decided improvement in the production of filaments, and, as a result, makes the following announcement:

Through improved processes of manufacture in our filament department, we have been enabled to produce a remarkably fine filament of high resistance, and can now furnish to central stations and to the general trade 8 and 10 candle-power lamps that are guaranteed to be exactly to candle-power and 3.5 watts of efficiency, making the total wattage of an 8-candle-power lamp 30; of a 10-candle-power lamp 35 watts.

These lamps are of excellent quality and retain their candle-power to a marked degree throughout their natural life. We are prepared to furnish them and to give an average guarantee upon them of 600 hours.

We are also enabled to furnish a 6-candle-power lamp which is exactly to candle-power and of 4 watts efficiency, making 24 watts to the lamp. These lamps are put up in special bulbs, and for them an extra price is charged.

The 8 and 10-candle-power lamps above named will be furnished at the regular price of standard lamps; viz., 20 cents each in barrel lots.

The price upon the 6-candle-power lamps will be 25 cents each, also in barrel lots.

The above prices are for lamps with Edison or Westinghouse base. For T.-H., U. S., B.-S. or Schaefer base, one cent extra will be charged.

We feel that this is a new departure in the lamp industry, and that the use of these lamps will, in many instances, result in a great economy of current and satisfaction to the user.

The same improved filament has enabled us to furnish our standard 16 candle-power lamp of 3.1 watts efficiency with a wonderful maintenance of candle-power.

BUSINESS NOTES.

The X-ray plates and films made by John Carbutt, Wayne Junction, Philadelphia, are being generally used by operators with good effects in X-ray photography. These plates are individually wrapped and so prepared that they are ready for immediate use.

The Peckham Truck Company, whose main offices are in the Havemeyer Building, New York, have issued a most elaborate catalogue, substantially bound in leather and elaborately printed on heavy calendered paper, with half-tone illustrations showing all the elements manufactured by the company for the Peckham trucks and motors; and some 25 different forms of the standard Peckham trucks are shown, also lever brakes and brake attachments, track scrapers, and much that is essential in the equipment of every street-car system.

Wanted—An Idea Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write JOHN WEDDERBURN & CO., Patent Attorneys, Washington, D. C., for their $1,800 prize offer and list of two hundred inventions wanted.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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